PAGE
1529
1530
1534
1551
1555
1563
1567
1575
1581
1599
1601
1607
1611
1615
1619
1623
1625
1633
1641
1643
1645
1647
1653
1657
1659
1663
1667
1671
1675
1681
1685
1695
1697

THE SURGICAL CLINICS
OF
NORTH AMERICA

Volume 6 Number 1

CLINIC OF DR. W. WAYNE BABCOCK

SAMARITAN HOSPITAL

ASSISTED BY JOHN O. BOWER, J. NORMAN COOMBS, J. HOWARD FRICK, G. MASON ASTLEY, HUGH HAYFORD, AND M. H. GUNN.
ANESTHETIC SUPERVISION BY HELEN C. KRAUSE, R. N.

---

1. DEMONSTRATION OF SPINAL ANESTHESIA. 2. SURGICAL CLINICS

Case I. Subacute Appendicitis.—Case II. Cholecystitis and Appendicitis.—Case III. Cholelithiasis; Chronic Salpingo-oöphoritis With Adherent Abdominal Scars.—Case IV. A New Operation for Aneurysm of Thoracic Aorta Perforating Right Anterior Thoracic Wall.—Case V. Pilonidal Sinus.—Case VI. Epididymitis. Tic Douloureux.—Case VII. Cholecystitis, Cholelithiasis, Relaxed Abdominal Wall, and Intra-abdominal Adhesions.—Case VIII. Depressed Nose Following Submucous Resection.—Case IX. Intra-abdominal Adhesions. Chronic Cholecystitis.—Case X. Suspected Brain Tumor.—Case XI. Puckered Adherent Ulcer of Duodenum.

1. DEMONSTRATION OF SPINAL ANESTHESIA

AT the first meeting of the Congress in 1911 we gave our impressions of spinal anesthesia, which we had then been using for six years (3500 intradural injections[1]). Today, after twenty years of use, with upward of 20,000 inductions made by members of our clinic, we can offer more mature but not final conclusions.

During the past ten years we have usually avoided this type of anesthesia when the operation entailed desperate risk: when the patient was shocked and nearly pulseless; septic, cyanotic,

[1] Surgery, Gynecology, and Obstetrics, November, 1912.

collapsed, senile, asthenic, and starved; distended and dyspneic; and in cases of extreme myocardial degeneration and obesity. It is most distressing to have a death, even from a perfectly natural cause, under an unconventional anesthetic; and with spinal anesthesia the limits of safety are sharply drawn, and in most cases may be predetermined. Yet 90 per cent. of our more serious operations below the diaphragm are done under rachianesthesia, and in a number of instances in which ether had previously been tried and abandoned because of the alarming symptoms produced, the results have been very successful. I feel confident that spinal anesthesia, *properly given*, is far safer than gas-oxygen or ether; but I cannot too strongly urge that a very careful technic and constant supervision are essential to safety. In the past eleven years, excluding 1 case of diffuse thrombosis from the intravascular injection of distilled water given by mistake for saline solution, I have had no death under stovain; during the same period a like number of general anesthesias in our own and associated hospital services resulted in 3 deaths from ether, 1 from chloroform, and 1 from nitrous oxid-oxygen. In none of these 5 cases did the patient's condition contraindicate the use of spinal anesthesia. Nevertheless, in spite of these encouraging figures, I consider ether safer *in unskilled hands* than spinal anesthesia. If spinal anesthesia is dangerous, it is because it is used carelessly and without recourse to the necessary protective measures; if it is ineffective, it is because the technic has not been perfected; if postoperative headache or other unpleasant secondary symptoms develop, something has been done that should not have been done. If I report fatalities I also report my personal incompetence. As I look back on the catastrophes of my earlier years with spinal anesthesia, I realize that they should not have occurred.

Nearly all of our operations on the skull, face, and neck are performed under local anesthesia, often with an associated narcotism to dull consciousness. Operations on the chest wall and the contents of the thorax are carried out under local, intercostal, or paravertebral block; operations on the breast under ethylene or local anesthesia, with associated narcotism; opera-

tions below the diaphragm, as a rule, under spinal anesthesia. If the operation is trivial, local anesthesia, nitrous oxid, or ethylene is used. If the abdomen is greatly distended, if there is serious respiratory or cardiac embarrassment, or if the patient is in collapse and evidently unable to withstand a sharp fall in blood-pressure, we use local anesthesia. If the patient is a poor anesthetic risk, exceedingly obese, wasted, weak and cachectic, or in profound shock from hemorrhage or injury, local anesthesia is selected. If the condition is alarming but not extreme, with an operative corps well trained to do an instant resuscitation, we often give spinal anesthesia, and immediately following this freely infiltrate the operative field with procain-adrenalin solution. The local injection reinforces the spinal anesthesia; *antidotes* the fall in blood-pressure; and, moreover, tends to prolong the analgesia. I have also tided a nearly pulseless patient through spinal anesthesia by the intermittent intravenous injection of a very dilute adrenalin saline solution.

In acute abdominal infections spinal anesthesia is unsurpassed. Nothing acts so quickly or gives such perfect relaxation of the abdominal wall with as little protoplasmic disturbance. Thus the operation may be performed with celerity and with the minimum of functional disturbance so important in peritonitis, while the associated stimulation of peristalsis and paralysis of the sphincter relieves tympany, and may cause the colon to be emptied during the operation.

In no other way can an equal degree of anesthesia be produced in the diabetic, the nephritic, the cholemic, with as little effect upon the parenchymatous organs. Think! ½ grain or 1 grain of drug which, when swallowed in capsule, produces effects so slight as to be detected with difficulty, when introduced in the dura produces complete analgesia with muscular relaxation of the lower half or two-thirds of the body, lasting forty to ninety minutes, and then passes off without evidence of residual toxemia. In acute or chronic respiratory disease here is an anesthetic that produces no strain on the respiratory organs. There is no period of excitement, no irritation of the air passage; rather, there is a sedation of the respiratory movements.

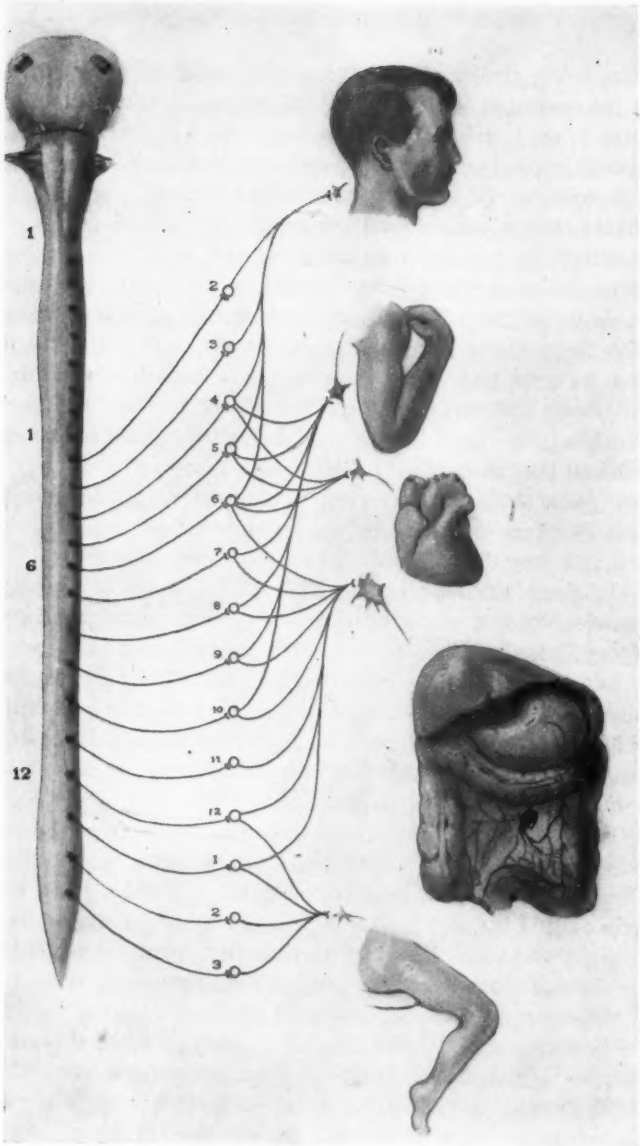

Fig. 1.

Consider very carefully before you undertake the use of spinal anesthesia. Do you live in a small and critical community where every symptom that may later develop will be linked to the unusual anesthetic? As the years pass by the infirmities and diseases of age will come to your patient, and as his prostate enlarges and his legs grow feeble and his eyesight less acute, he may reproach you. For some one will suggest that his symptoms are inevitable because, years before, you gave him spinal anesthesia. Recently a patient wrote me asking how long it would be before her paralysis would begin; a physician had assured her that every patient who had been under spinal anesthesia would sooner or later be paralyzed. If your surgical practice is sufficiently large, some of your patients will inevitably develop paralysis, functional, syphilitic, or otherwise, but there is little legitimate reason why you should so mangle the cord or nerve roots in your manipulation as to produce a palsy from the intradural injection.

More important is it that you understand the physiology and technic of the intradural injection, and especially that you know how to meet the emergencies of spinal anesthesia instantly.

The *physiology of rachianesthesia* is that of a transient root interruption, chiefly affecting the posterior roots, with consequent analgesia and loss of tactile, muscle, and temperature sense. But the anterior roots with the associated white rami communicantes are also blocked, causing transient motor paralysis, and, especially important, transient vasomotor paralysis. The posterior root block is essential that the operation be painless; the anterior root interruption desirable, that the operation may be done with the ease and facility that complete muscular relaxation affords; but the interruption of the white rami, while it reduces bleeding and favors intestinal contraction

Fig. 1.—The physiology of the fall of blood-pressure under spinal anesthesia. From the second thoracic to the third lumbar the anterior nerve roots carry white rami which supply through the intervening ganglia the blood-vessel walls of the entire body. The fall in blood-pressure during spinal anesthesia depends on the number and position of the anterior nerve roots blocked by the drug. When all the nerve roots carrying white rami are interrupted there is vasoparesis of the entire body.

and peristalsis, leads to a slowing and weakening of the heart action and a fall in blood-pressure that may be hazardous.

For animals which sit or stand erect a vasoconstrictor system is essential. But when the Lord in the Garden of Eden consigned the serpent to travel forever on its belly, He made the edict operative by removing the vasomotor system; and ever since, a snake suspended by the head may suffer and finally die from failure of the blood to ascend to the heart. Likewise, with a high spinal anesthesia, the patient may become pulseless when the head is raised, or even placed on a level with the rest of the body (Fig. 1). As the white rami through which sympathetic impulses are conducted to the entire body are associated only with the anterior roots from the second thoracic to the third lumbar, it is evident that if the anesthesia involves only the lower lumbar and sacral roots, there will be no effect upon the blood-pressure; but if the fibers supplying the great splanchnic vessels and those of the upper part of the body are affected, a great fall in blood-pressure will result. This fall in pressure, which usually lasts but fifteen to thirty minutes, may be combated by introducing fluid into the blood-vessels, especially serum or gum acacia solution; or, more powerfully, by the peripheral constrictive action of adrenalin on the blood-vessels, and its intense stimulating action on the heart when it enters the coronary arteries.

Resuscitation.—For safety we insist that the blood-pressure be watched throughout each operation under spinal anesthesia, and that the simple apparatus needed for an intravenous infusion be always at hand. The cortex of the brain degenerates and the patient's condition is hopeless if the circulation stops for seven minutes or more. So we feel that occasional, timed Resuscitation Drills are desirable to maintain efficiency in the operating room. If you find it requires more than five minutes for an intravenous injection from the time your emergency order is given, your operating craft is dangerous and unseaworthy, and you are risking your surgical passengers' lives in rotten bottoms unable to withstand the storm of emergency. Such carelessness would not be tolerated in the maritime trade.

2. SURGICAL CLINICS

SUBACUTE APPENDICITIS

M. K., age nineteen; single, Russian; factory operator.

Chief Complaint.—Abdominal colic, vomiting, tenderness of lower abdomen.

Present Illness.—Abdominal cramps began one week ago, followed by vomiting and partial localization in right and left lower abdomen.

Past History.—Morning nausea or vomiting since leaving Russia one and a half years ago. "Rheumatism" of arms and legs one year ago. Slight cough for one year. Dyspnea on exertion. Edema of feet on arising.

Physical Examination.—Well developed and nourished. Heart sounds indistinct, no murmurs, subcrepitant râles left chest, middle lobe. Tenderness with increased resistance at McBurney's point.

Anesthesia.—Stovain, 6 cgm., in first lumbar interspace.

Operation.—Four cm. transverse gridiron incision.

Appendectomy without suture or inversion of stump.

Layer continuous suture No. 1 chromic catgut for deeper layers of abdominal wall, with subcuticular No. 00 plain catgut for skin.

Appendix 8 cm. long, mucosa thickened, slight injection of serous coat, soft fecal contents.

Pathologic report (Dr. Clark): Mucosa catarrhal; lymphoid follicles slightly hypertrophic; submucosa diffusely infiltrated with round-cells. Chronic appendicitis.

Blood-pressure fell from 114/78 to 60/00 ten minutes after the injection, and rose to 92/70 by close of operation, with transient nausea and slight vomiting.

Postoperative Course.—Uncomplicated. Out of bed on the fourth day. Discharged on the seventh day.

The patient now on the operating table had a systolic pressure of 114 before the intradural injection of stovain. Now, after ten minutes, it has fallen to 60. To test our operating room efficiency, and especially to illustrate the simplicity of the procedure, we will order an emergency resuscitation. Note that the anesthetist continues to watch the blood-pressure, the respiration, the color. Nurse No. 1 instantly brings the small covered tray, always kept close at hand for the emergency. Sterilized, and on the tray, is a non-corrosive intravenous needle connected by 4 feet of small hose with a buret or funnel holding 250 c.c., together with an elastic band, a scalpel, forceps, and ligature, and 1 : 1000 adrenalin solution. As the nurse brings the tray, Dr. Frick steps to the arm of the patient opposite the

operator, prepares the skin over the basilic vein as Nurse No. 2 brings up a flask of warm physiologic saline solution which she pours into the buret held by Nurse No. 1, expels air from the tubing, and drops 3 minims of adrenalin in the 75 c.c. of saline remaining in the buret. In the meantime Dr. Frick has introduced the needle into the vein and, with the slip socket, connected the needle with the tubing to the buret. One minute and thirty seconds have now elapsed since the order was given —25 c.c. of solution containing 1 minim of adrenalin have entered the vein, the anesthetist reports a rise in systolic pressure of 35 points; so we will discontinue the injection. With this preparation, and with assistants as efficient and well trained as these, most deaths from ether, chloroform, nitrous oxid, or spinal anesthesia could be prevented. I know of no less than 10 deaths under anesthesia which I am sure were due to tardy, inefficient, and bungling methods of resuscitation. I have seen twenty-five minutes lost in attempting to give an intravenous injection.

It is most important that the intravenous injection be given before the heart stops beating; for, when the heart has ceased to contract, the intraventricular injection of adrenalin, or cardiac massage usually is also necessary. We prefer the injection of very dilute solutions of adrenalin into the veins to avoid a violent reaction. If ½ minim of adrenalin will sufficiently raise the pressure, it is unwise to subject the patient to the violent stimulus of 3 or 5 minims. Following the injection of 3 minims I have felt the patient's body and even the operating table shake from the violence of the cardiac contractions. Yet the fatty or degenerated myocardium may require 10, 30, 90, or even more minims of the strong solution of adrenalin to arouse it into action. There is, then, no stated dose for the intravenous injection; but by progressive additions and with increasing concentration we introduce the adrenalin solution into the vein until a response shown by an improvement in the pulse is detected. The tube is then clamped and the flow interrupted until the need of further stimulus is evident. The stimulation from adrenalin only lasts twenty or thirty minutes, but, for-

tunately, conduction through the white rami with a gradual increase in the blood-pressure usually is resumed about twenty-five to thirty minutes after the induction of spinal anesthesia, rendering additional adrenalin unnecessary.

If not only the anterior thoracic roots but also the third, fourth, and fifth cervical roots supplying the diaphragm are blocked, the patient will be unable to move the tidal air in the lungs, even though the accessory muscles of respiration in the neck continue to contract. The lips and tongue may move, yet the patient is unable to make a sound. Then cyanosis and unconsciousness quickly follow. The heart will be unable to continue beating and the patient will die unless artificial respiration is given. Affix a delicate wisp of cotton to the tip of the nose by adhesive plaster or collodion to indicate the air movements, and with the arms extended alongside of the head rhythmically compress the chest 12 to 14 times a minute. To do this stand on the right side of the patient, clasp your hands together and place them palms down over the sternum, while the elbows are applied to the sides of the thorax. Press evenly downward, inward, and backward, and note the expiratory effect registered upon the wisp of cotton on the nose. If a good current of tidal air is produced, continue the movements, the elasticity of the chest causing inhalation. But the cotton may not move; the anesthetist is not holding the tongue and jaw sufficiently forward, or the head is not in proper position. In several instances, owing to rigidity of the chest, consolidation of the lung, or other cause, we have been unable to move the air from the lungs. If this is the case, without delay step to the right side of the head of the patient, see that the tongue is forward and the mouth held open, if necessary, by a small mouth-gag, cover the patient's mouth with a thin towel or two or three layers of gauze, and with your left hand compress the patient's nostrils, and with your right, his epigastrium, to prevent distention of the stomach by air. Take a deep breath, apply your widely opened mouth over that of the patient, and blow. Even the most rigid chest will be observed to rise under this forced insufflation, and as the pressure in the patient's lungs cannot

exceed or even equal that in your own, there is no danger in the adult of excessive pressure in the alveoli as may happen with the pulmotor. Of course with small children care should be taken not to use such force as to rupture alveoli.

Exhalation which is clearly audible should be aided by compression of the chest. In several instances I have seen this old but very valuable expedient of mouth-to-mouth insufflation prevent a death on the table. I would urge, however, that you never have confidence in your method of artificial respiration until, by the ear or the tell-tale wisp of cotton, you have demonstrated a sufficient movement of the tidal air. If the collapse occurs under a general anesthetic or under a local anesthetic, the treatment is the same: the maintenance of the heart action and a moderate blood-pressure, and the continuance of respiration, if necessary, by this effective but simple and always available means. It is also important in all cases to prevent loss of heat from the patient's body. If the patient is breathing and there has been a sudden collapse from the accidental injection into a blood-vessel during the administration of a local anesthetic, a brief inhalation of ether should instantly be given, pending the application of the other restorative measures.

It is most important that your operating force be trained for the emergency; and that you do not permit any diversion from the paramount restorative measures, during the period of great collapse by useless subcutaneous injections or other ineffective measures.

Certain expedients prevent the excessive fall of blood-pressure under spinal anesthesia. A weaker drug, such as procain (novocain), has less effect than the stronger stovain. Butyn is very powerful and has an intense and prolonged action on the sympathetic fibers. A small dose (4 cgm. of stovain or 9 cgm. of procain) has less effect than a maximum dose, such as 6 cgm. of stovain, or 15 of procain. With equal doses and equal heights of analgesia, the more dilute the solution, the less the vasomotor depression. Thus, if I first withdraw cerebrospinal fluid and permit it to dilute my solution of stovain, there is less nausea and less hypotension. But if the dilution is excessive,

the analgesia, muscular relaxation, and duration of anesthesia may be curtailed. We have found procain unreliable if used in solutions of less than 8 per cent.; stovain in solutions of less than 4 per cent., and butyn in solutions of less than 2 per cent. concentration (Fig. 2). Of course these percentage strengths are rapidly reduced after the injection by admixture with the cerebrospinal fluid. The percentage strengths given apply to solu-

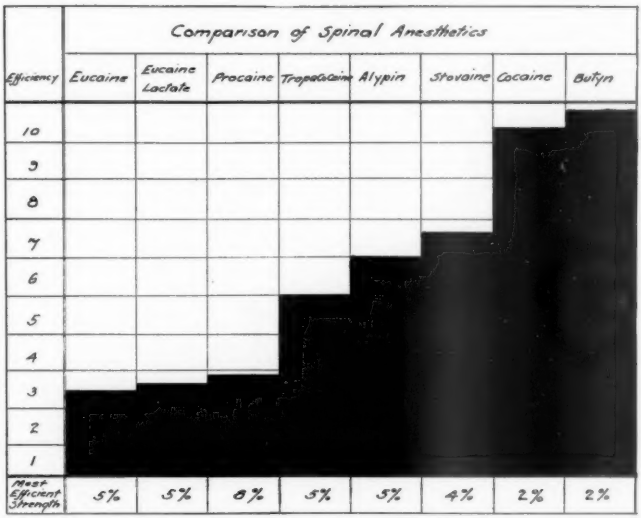

Fig. 2.—A comparison of spinal anesthetics. Different local anesthetics used in spinal anesthesia vary in efficient percentage strength and in activity. The efficiency is arbitrarily expressed in decimals. It will be noted that stovain, cocain, and butyn are the most powerful of the drugs given.

tions rendered more diffusible and lighter by the addition of 10 per cent. alcohol, and should be modified for solutions made heavy and less diffusible by the addition of glucose, mannitol, or similar substances, or for solutions improvised at the time of injection by dissolving a given amount of anesthetic drug directly into the withdrawn cerebrospinal fluid. As a rule, larger doses are required with these heavier solutions.

The location of the anterior nerve roots that are bathed by the solution of the drug also has an important influence (Fig. 3). As a rule, the fall in blood-pressure is directly as the height of motor paralysis plus the strength, concentration, and dose of the particular anesthetic used. Thus Jonnesco for his high spinal injections found it necessary to reduce the dose of stovain to 3 cgm., while he was able to use the excessive dose of 10 cgm.

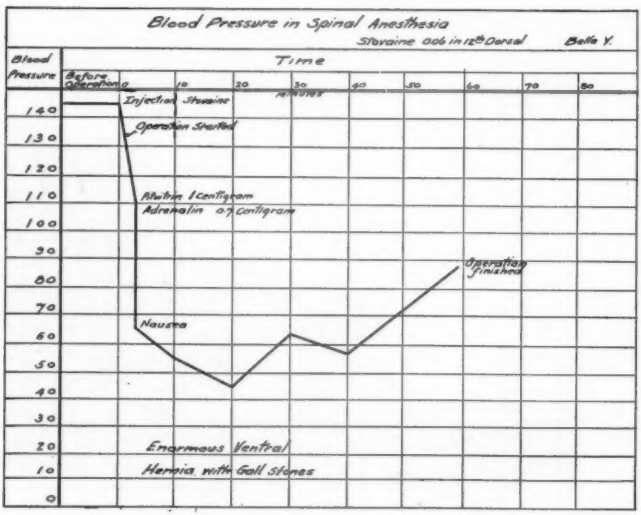

Fig. 3.—Diagram showing the effect of spinal anesthesia upon the blood pressure. If only the lower spinal segments are involved there is but little fall in blood-pressure. If the thoracic segments are involved there is a rapid and very marked fall in blood-pressure. The effect produced is, of course, modified by the concentration and activity of the anesthetic employed.

for his lower lumbar injections. Halve the dose and you divide the duration of the analgesia in minutes by 4. Thus 6 cgm. of stovain produces anesthesia for sixty to ninety minutes, 3 cgm. for only fifteen to twenty-three minutes. In other words, to determine roughly the duration of analgesia from a divided dose, divide the normal time from a full dose by the square of the divisor (Fig. 4).

The normal dose of a diffusible solution becomes fixed to the nerve roots in about ten minutes. Thereafter the location of the nerve block cannot be changed by manipulation of the patient. If an excessive dose in concentrated or non-diffusible medium is used, there may be delay in the fixation of anesthetic, and movement of the patient may lead to the unexpected blocking of additional nerve roots. For example, if a large dose in heavy

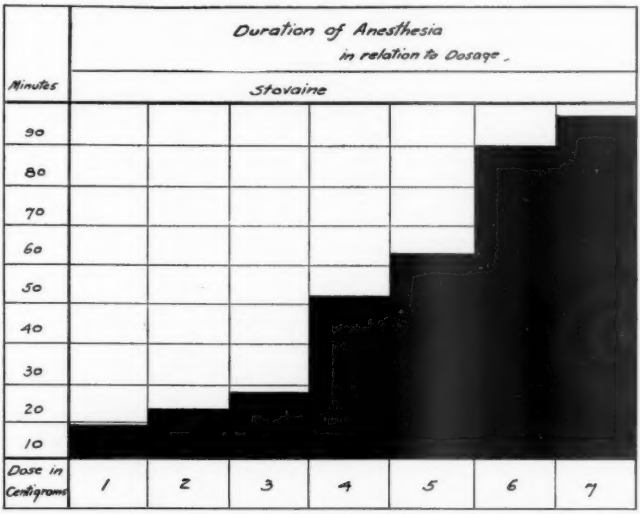

Fig. 4.—The duration of the spinal anesthesia is inversely as the square of the dosage. Thus 1 cgm. of stovain gives anesthesia for about eight minutes; 3 cgm., for about eighteen minutes, and 6 cgm., for about ninety minutes.

solution has been injected, the drug may for a considerable time gravitate to the dependent part of the spinal canal. If the operation has been short, and the hips are raised for the application of a bandage, such a heavy solution may gravitate to the cervical region and cause sudden respiratory failure. We prefer, therefore, to use the minimum dose in a light, diffusible solution, to give the injection in the operating room on the operating table, to incline the upper part of the body for at least thirty

minutes after the injection, and not to permit the patient's body to be moved or shaken until the anesthetic has become fixed (Fig. 5).

To better answer your questions as to details we will throw a synopsis of our technic upon the screen while the injection is being given to the next patient.

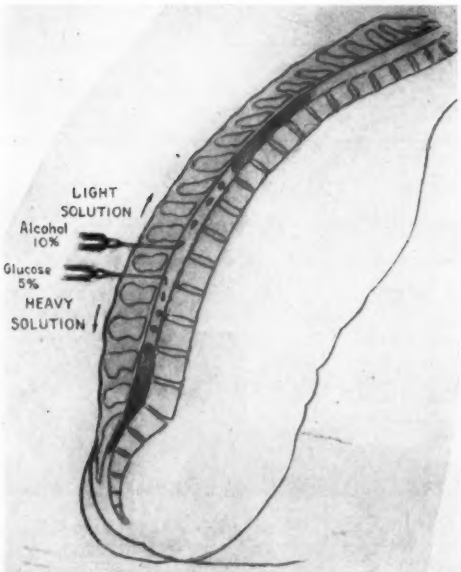

Fig. 5.—Influence of gravity in spinal anesthesia. If a heavy solution is employed it falls in the spinal canal, while a solution made light by the addition of alcohol rises.

TECHNIC OF INJECTION

POSTURE: The injection is made preferably with the patient in a sitting position; in special cases in a lateral reclining position. The back is arched rather than inclined forward. The patient is supported and firmly held (Fig. 6).

SKIN PREPARED by shaving, washing, and 3½ per cent. tincture of iodin, as for an abdominal section.

INTERSPACE LOCATED by counting from

1. Most prominent interspace, twelfth dorsal.
2. Level iliac crests, fourth lumbar.
3. Level of scapular angles, seventh dorsal.

INTERSPACE SELECTED that covers nerve roots supplying operative field:

1. For upper abdomen, eleventh or twelfth dorsal.
2. For midabdomen, first lumbar.
3. For lower abdomen and legs, second lumbar.
4. For rectum, perineum, third or fourth lumbar.

Fig. 6.—Method of holding patient for intradural injection. The assistant stands on a stool above the level of the patient, with the patient's neck under the assistant's left axilla. With his hands he grasps the patient's wrists. Then by bearing downward upon the patient's neck, and backward, with the hands grasping the patient's wrists, the back is properly arched. The back should be arched rather than inclined forward.

SOLUTION USED for past fifteen years:

Stovain	0.08 gram
Acid lactic	0.01 "
Alcohol	0.20 "
Water, distilled, to make	2 c.c.

SPECIFIC GRAVITY OF SOLUTION: 0.992.

SPECIFIC GRAVITY OF CEREBROSPINAL FLUID: 1.0055.
ALCOHOL used to give lightness.

Fig. 7.—Spinal anesthesia: Localization of the spinous interspaces. The first thoracic spine, the vertebra prominens, is easily located. The third thoracic interspace is opposite the spines of the scapula, the seventh opposite the lower angle of the scapula. The twelfth thoracic interspace is the greatest depression in this portion of the back. The fourth lumbar interspace is on a level with the iliac crests. By determining any one of these spines any desired interspace may be located by counting up or down.

LACTIC ACID to prevent precipitation of stovain by alkaline cerebrospinal fluid.

MAXIMUM DOSE governed by general vitality of patient, and the capacity of intradural space, rather than by body weight.

AGE: 5 days, 0.25 c.c. of sol. 0.01 gm. or 1/6 gr. of stovain.
5 years, 0.75 c.c. of sol. 0.03 gm. or 1/2 gr. of stovain.
12 years, 1 c.c. of sol. 0.04 gm. or 4/6 gr. of stovain.
21 years, 1.5 c.c. of sol. 0.06 gm. or 1 gr. of stovain.
75 years, 1.25 c.c. of sol. 0.05 gm. or 5/6 gr. of stovain.

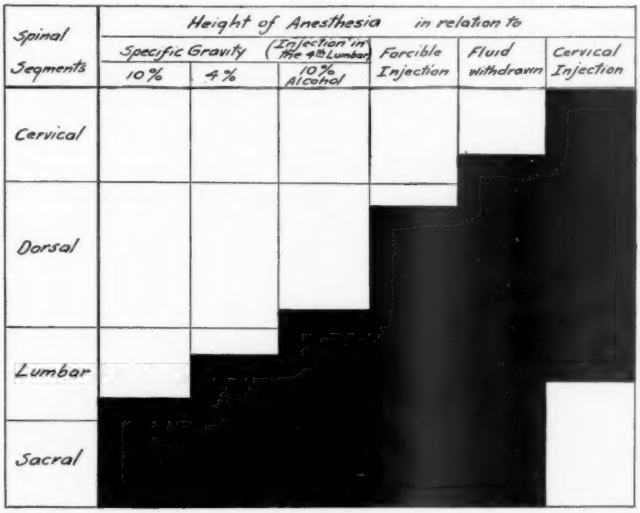

Fig. 8.—Height of anesthesia. The height of anesthesia from a given dose of a local anesthetic injected through a definite interspace will vary according to the specific gravity of the solution used, the force of the injection, the amount of fluid withdrawn, and the decompression of the dura. A heavy 10 per cent. solution of stovain injected through the fourth lumbar interspace rarely induces anesthesia above the lower lumbar segments. By dilution, so that a 4 per cent. solution is injected, the midlumbar region is reached. By decreasing the specific gravity below that of the cerebrospinal fluid, as when 10 per cent. alcohol is added, the area of anesthesia is higher and the lower dorsal segments are affected. Forcible injection, the bulk of injection, and the amount of fluid previously withdrawn greatly influence the height of anesthesia. If the injection is made through a higher interspace, as in the cervical region, analgesia of all of the upper nerve roots may be produced, but as impulses continue to travel through the spinal cord the lower lumbar and sacral segments carry sensation and motion.

IN HYPOTENSION, debility, exhaustion, senility, excessive obesity, reduce dose. If (procain) novocain is used, multiply dose by 2½ to obtain proportionate effect.

APPARATUS: 1. Luer type 2 c.c. syringe has lightest, most sensitive piston to intradural pressure.

2. Small needle, No. 20 or 21 gauge, of nickeloid with special short sharp bevel. Average needle too large, causing pain and postoperative headache. Syringe and needle wrapped in gauze, boiled in distilled water, and brought to operator boiling hot, to insure warmth and sterility of injected solution.

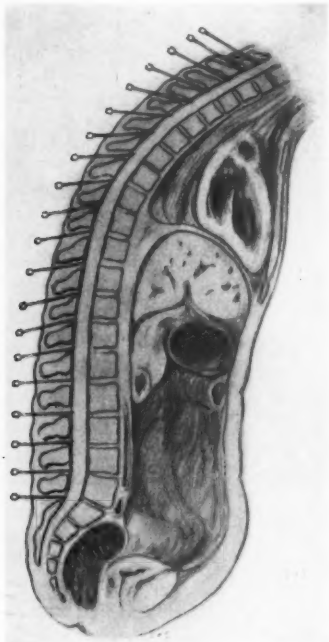

Fig. 9.—Showing the proper direction for introducing the needle for spinal anesthesia. In the lumbar region the needle should enter about the middle of the interspace, at right angles to the skin. In the middle and upper thoracic regions the needle is inclined progressively cephalad.

No other person permitted to touch syringe. (No infection in twenty years' use.)

TECHNIC: 1. Solution measured in accurate syringe and air expelled.

2. Needle introduced in midline in center of interspace, at right angles to skin (no failure to enter canal in past 10,000 injections), so that cerebrospinal fluid flows freely (Fig. 9). No cerebrospinal fluid, no anesthesia! Resistance to needle by dense interspinous ligament indicates proper orientation

of needle. If needle is felt to be in loose non-resisting tissue, it has deviated to the side.

INJECTION: Syringe affixed and piston first gently withdrawn to prove proper position of needle, and to dilute the solution first injected. Solution injected evenly, without force, and with uniform pressure, and repeated gentle withdrawals of piston to ensure diffusion. Accurate uniform technic in injection gives uniform anesthesia, and less than 1 per cent. of failures. The injection is completed in ten seconds, and patient is instantly placed with shoulders 4 to 6 inches below the level of the hips to prevent upward diffusion of stovain. No dressing is required for puncture.

ANALGESIA should instantly appear and the operation is started without delay. If no analgesia in ten minutes, sit patient on table and repeat injection with regular dose.

SUPERVISION: For at least thirty-five minutes after the injection a trained assistant constantly watches the blood-pressure, pulse and respiration, and diverts the patient's mind by conversation, or the odor of aromatic spirits of ammonia, alcohol, or ether. Note that patient is never verbally asked if he has pain, nor is anything to suggest fear, danger, or distress permitted to reach the patient. To determine anesthesia the skin is surrepticiously pinched while watching the patient's face.

DURATION OF ANESTHESIA: The maximum dose, 0.06 gr. of stovain, gives analgesia for sixty to ninety minutes. If more time is required for the operation, a little gas, ethylene, ether, or a local anesthetic may be given.

UNCONSCIOUSNESS: Morphin, gr. 1/6, and scopolamin, gr. 1/100, is usually given to adults one hour before the time of operation. If complete unconsciousness is required, a very light and often intermittent inhalation of gas oxygen or ethylene is given.

BY-EFFECTS: *Transient nausea* five to fifteen minutes after the injection is frequent where high anesthesia is produced, from cerebral anemia; and probably a special action on vomiting center in medulla. To relieve this lower the head and give inhalations of ammonia.

Fall of blood-pressure, slight or absent in lower lumbar anesthesia, marked in lower dorsal anesthesia from block of white rami. If systolic pressure falls to 35 mg. of Hg., prepare patient's arm; if below 30, introduce salt solution in a vein with sufficient adrenalin to raise pressure to 100. Pituitrin, strychnin, atropin, caffein useless. Ether, ammonia of slight value. Adrenalin in veins or heart—very powerful. Note! Transfusion tray always at hand for instant use.

Cessation of heart action indicates failure to watch blood-pressure, or delay or fumbling in intravenous injection. Resort to cardiac injection or cardiac massage, and adrenalin intravenously.

Cessation of respiration indicates high anesthesia, block of 3, 4, 5, anterior cervical roots, or delay in maintaining blood-pressure. Relieve by artificial respiration, thoracic compression, or mouth-to-mouth insufflation until respirations are spontaneously resumed.

Postoperative headache indicates use of irritating solution, dural leakage from use of large needle, or other intradural disturbance. Should be less than from ether.

Postoperative palsy, twenty years' use, as many as thirteen repeated injections in the same patient, lead us to doubt the development of late palsy from the proper use of spinal anesthesia. Abducens palsy, an infectious process, does not follow the use of sterile solutions.

MORTALITY (1904 to 1914): Blood-pressure not watched, untrained observers, spinal anesthesia used in all bad operative risks, resuscitative measures not developed—1 death in 500 cases under spinal anesthesia.

1914 to 1925: Blood-pressure watched, trained observers, assistants trained in resuscitative measures, local anesthesia given to most bad risks—no deaths from stovain; 1 death under butyn, unwisely given to an aged man with advanced intestinal obstruction from cancer.

CHOLECYSTITIS AND APPENDICITIS

We should not forget that there is an art as well as a science in surgery, and that the ugly oblique and vertical incisions used

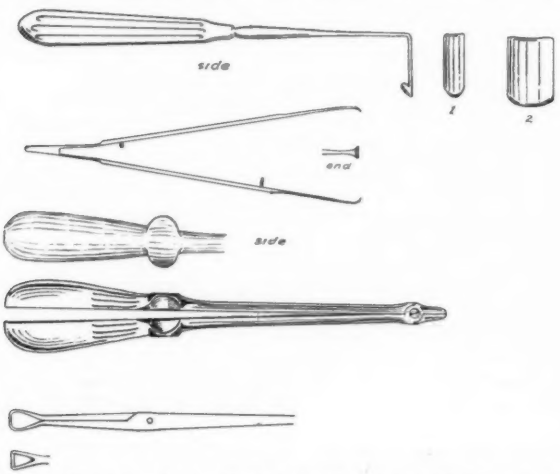

Fig. 10.—Retractors for small abdominal incisions, with edges, to facilitate easy introduction without slipping. The thumb forceps strong enough to hold, yet with teeth too fine to crush, puncture or tear. The needle-holder without distracting or time-absorbing springs and catches, that senses the slightest pressure on the needle, holds like the fingers of Hercules and releases the instant the hand relaxes. Viscera forceps that could be applied to the eyelid without harm, and yet hold so tenaciously that any safe degree of traction can be made upon a loop of delicate bowel.

for appendectomy are often unnecessary. The years of our novitiate may be marked by disfiguring, crudely closed incisions;

but as we progress, we aspire to small inconspicuous scars, and to accurately united layers without injury to important nerves and blood-vessels. We turn to a knife that is small and exceedingly sharp, to a thumb forceps, strong enough to hold, yet with teeth too fine to crush or tear; to viscera forceps that could be applied to the eyelid without harm, and yet that hold so tenaciously that any safe degree of traction may be made upon a loop of delicate bowel; and to a needle-holder without

Fig. 11.—Appendectomy: Transverse skin incision. Aponeurosis of external oblique exposed and fibers split.

springs or catches, that senses the slightest pressure on the needle, holds like the fingers of Hercules, and releases the instant the hand relaxes (Fig. 10).

For the usual appendectomy, a 4 or 5 cm. transverse incision, starting 1 cm. inside the anterior iliac spine, is sufficient. For satisfactory exposure through such a short incision, small retractors with a special edge to prevent slipping or injury, and with blades that are not curved, are desirable (Fig. 11).

The appendix is located by sight, by following down the anterior longitudinal band of the cecum, or by a finger introduced through the incision. To facilitate removal through the small opening, the tip of the appendix is first delivered, and the meso-appendix and any adherent or restraining bands or folds clamped by a succession of hemostats. In this way the appendix is gradually cut free and delivered with the end of the cecum. (Fig. 12). With a deeply adherent or retrocecal appendix a

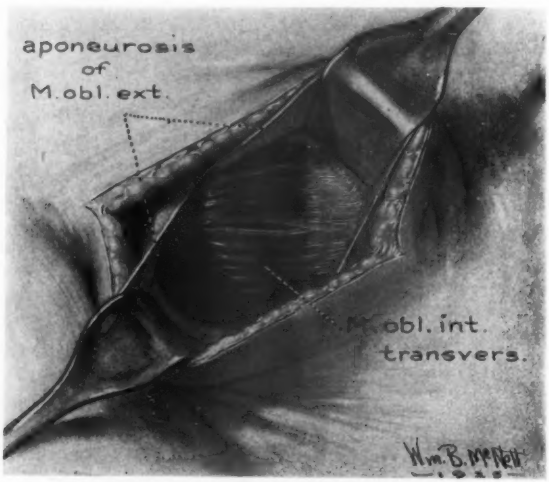

Fig. 12.—Appendectomy: Muscular substance of internal oblique and transversalis exposed and divided along the course of their fibers.

retrograde removal may be easier. The base of the appendix is located, divided by cautery between clamps or ligatures, and the appendix gradually liberated from base to tip, the vessels being successively caught and occluded as usual.

We have found that forceps used merely to crush the appendix will give a luxuriant growth of colon bacilli, the bacteria being forced through the walls in crushing; while a purse-string or other occlusive suture introduced into the cecum may also be contaminated by passing through Peyer's patches

that lie so close to the serosa. The contamination thus produced does not cause a noticeable peritonitis, but gives the occa-

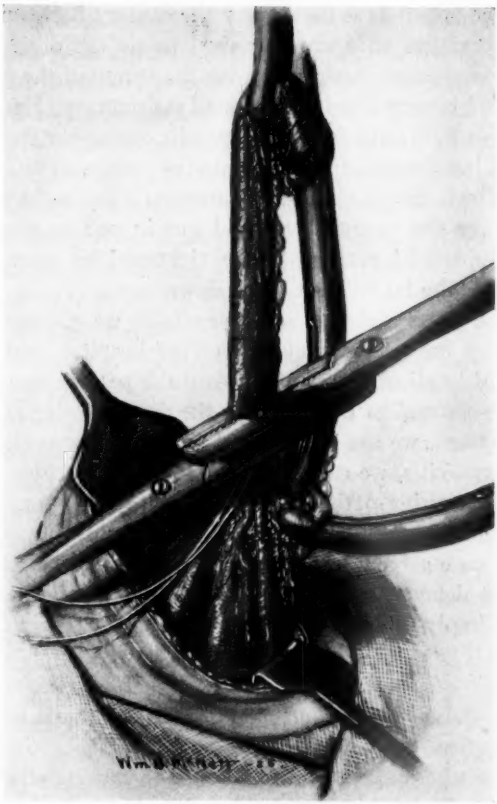

Fig. 13.—Appendectomy: The appendix is gradually delivered through the small incision by grasping and dividing adhesive bands and the meso-appendix. The base of the appendix is then doubly ligated with chromic catgut, and forceps applied, preliminary to division by the cautery. The ligature to the base of the appendix is used to tie the meso-appendix in sections over the stump. The purse-string suture is a source of wound infection.

sional characteristic infection of the subcutaneous fat. Therefore we eliminate the strong crushing forceps and the suture in

the cecum. You will observe that two ligatures of 0 or 1 chromic catgut are tied around the base of the appendix, and the ends of one of these ligatures left long. Three or 4 mm. distal to the ligature the appendix is divided by the cautery between forceps. The long ligature ends are now used to tie the divided meso-appendix in a series of segments over the stump of the appendix. The method is very simple, rapid, and satisfactory (Fig. 13). If pus or other fluid leaks from the appendix during the enucleation, blot it up, but do not irrigate or drain the peritoneal cavity or the muscle. Drain the skin and subcutaneous fat layers, however, or, better, leave the wound open, and put in one or several provisional superficial sutures, to be tightened as soon as it is evident that the fat will not break down.

In *acute fulminant types of appendicitis* we operate at once unless delay has occurred outside of the hospital, and there is evidence of localization, in which case the patient may be held for a more convenient time, usually the day following admission. If, as surgeons, we are not prompt in caring for patients with acute appendicitis, we cannot expect general practitioners to be prompt in referring patients to us. Thus a large percentage of the patients with acute appendicitis are operated upon by my assistants on emergency service during the middle of the night. To me the delayed operation in acute appendicitis has always seemed to imply that undesirable corollary: "It is permissible to delay."

In *cases of purulent peritonitis from appendicitis* we find spinal anesthesia invaluable. The perfect anesthesia with absolute relaxation of the abdominal muscles, the inconspicuous general toxemia, and the powerful action in causing an emptying of the lower bowel, give the lumbar injection advantages over any known method of anesthesia. The entrance of salt solution or procain into the peritoneal cavity in the presence of peritonitis is harmful, and, therefore, local anesthesia is objectionable. An anesthetic that increases the toxemia of the peritonitis or reduces the resistance of the patient or peritoneum, or that renders the operation slower, more difficult or more traumatic, should be avoided if possible. Realizing that much of the pus

in peritonitis is bacteriolytic, antitoxic, protective, we do not use drainage for fresh pus. For we must now confess that, after all, peritoneal pus may be truly laudable, although in our ignorance we often used to laugh at this favored term of our forbears. For solid exudates, foreign bodies, blood or blood-clot, or old pus with many dead cells drainage is demanded, but usually of a very simple character, but to the special focus or to the bottom of the pelvis, not between the intestinal coils. Packing, sponging, wiping, or the introduction of the hand into the abdomen is to be avoided in cases of peritonitis. So often it has not been delay, but the overzealous and meddlesome surgeon who has sealed the fate of the patient.

In the *after-treatment* we have largely abandoned proctoclysis. Why should we depend on the uncertain absorption of manure water from the rectum and lower colon, when clean solutions are positively absorbed from the subcutaneous tissues? With two or three non-corrosive needles, and a gravity of 4 to 20 inches, 3000 to 5000 c.c. of solution may be taken into the system from the subcutaneous tissues every twenty-four hours. The rectal injections also cause peristaltic unrest, so undesirable in the localizing period of peritonitis.

If there is a *high ileus* or *jejunal toxemia*, the use of full doses of salt under the skin or into the veins to combat the loss of chlorids and the alkalinosis seems most important; and in selected cases a small high enterostomy is life-saving. The thoracic duct drainage of Costain has not fulfilled the early predictions from the laboratory. During the active stage of peritonitis the function of the peritoneum is exudative and protective, and nothing should be done to make it absorptive. The importance of withholding all food and water by mouth until complete localization to a limited area of the peritoneum has occurred should be so well known as not to require emphasis. Localization is indicated by the subsidence of pain and tympany with the expulsion of gas and feces, and the stabilization of the pulse and temperature. If with these symptoms, a test by the cautious administration of a little liquid is followed by pain, increase in tympany, and perhaps an increase in temperature and return

of nausea, it indicates that the degree of localization is not yet sufficient to withstand peristaltic action, and further delay in giving anything by mouth is indicated.

In giving spinal anesthesia we mark the point of injection with the finger-nail as the ball of the thumb rests against the lower edge of the selected spinous process (Fig. 14). In a fat person, like this patient, the line may be a little low. The needle enters the midline near the center of the interspace. After

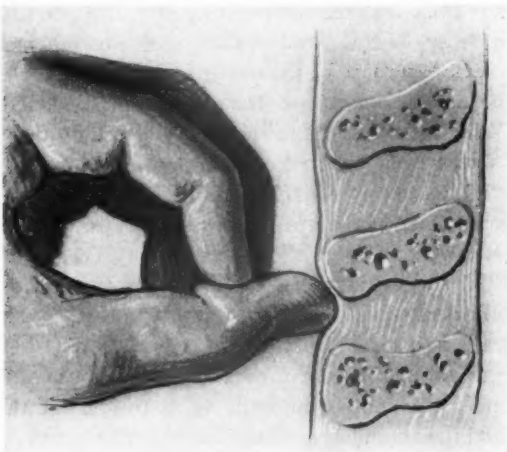

Fig. 14.—Marking the point for the introduction of the needle. With the ball of the thumb pressed against the lower edge of the spinous process the finger-nail of the gloved thumb is caused to make a line upon the skin, through which the needle is entered.

starting, the needle is oriented by locating the sides of the spinous processes with the tips of the index-fingers; even though there is scoliosis, the needle is carried directly forward between the spines. Should the point of the needle enter loose, non-resistant tissue instead of the cartilage-like interspinous ligament, it should be withdrawn and the direction changed. Rarely there is insufficient space for the needle between the two lamina, in which case the needle is withdrawn and the interspace above

or below used. Cerebrospinal fluid runs freely from the needle, and the 2-c.c. Luer syringe containing 1.25 c.c. of the 4 per cent. alcoholized stovain is affixed to the needle. Note that I first withdraw the piston, proving free communication with the arachnoid space, and diluting the anesthetic solution to 2 c.c. The injection is now made with several partial withdrawals of the piston to produce good diffusion, the needle withdrawn, and the patient instantly placed in position on the table with the hips several inches higher than the shoulders. The solution used is sterile, keeps for years, has a specific gravity below that of water, and is given in a fraction of the time required to prepare a solution by dissolving a powder or tablet in a quantity of withdrawn cerebrospinal fluid. Delays may mean much to the nervous or weak adult or child during the trying period while he sits with the needle in his back.

The entire procedure takes but a few seconds. The patient should then be ready for operation, as the analgesia develops almost instantly. We interrogate the patient as to the completeness of the analgesia, not by word of mouth, for this would arouse the thought of pain in the patient's mind, but by noting the patient's reaction as we clip the towels to the skin about the field of operation.

The first effect of the spinal injection is loss of protopathic or pain sense. Epicritic sensation, or sense of touch, pressure, and temperature, is lost later; and with a weak drug or insufficient dose may not entirely disappear. This impressed me during the period when we used novocain: patients had no pain, but felt the manipulations, the pressure, or the coldness of the knife, and frequently protested. Moreover, the anterior roots, which are less sensitive, often were not fully blocked, and there was not complete relaxation of the abdominal walls; consequently operations were not always done with the facility that spinal anesthesia should afford. So, after about 2000 injections of novocain, we returned to the more powerful stovain. We pay for the increased efficiency by a greater fall in blood-pressure, but the comfort to the patient and facility for the operator are worth this price.

Mrs. R. B. Age twenty-six; white. Jewish. Housewife.

Chief Complaint.—Attacks of pain in lower right quadrant, and in upper right quadrant radiating to back, with indigestion.

Present Illness.—Attacks of right-sided abdominal pain lasting a day or less for twelve years. Worse in 1923 during pregnancy. For five weeks almost continuous pain in right lower quadrant, at times associated with nausea, and relieved by soda. Indigestion with fulness and eructations. Puberty at twelve; 2 children. Previous tonsillectomy.

Physical Examination.—Obese young woman with thick abdominal wall and deep point of abdominal tenderness above McBurney's point.

Anesthesia.—Stovain 6 cgm. in first lumbar interspace.

Operation.—10 cm. vertical upper midrectus incision. Abdominal exploration. Cholecystectomy. Appendectomy. Gall-bladder bed closed by suture, no drain. Enlarged periportal lymph-nodes. Gall-bladder whitish, walls thickened, bile dark and thick, strawberry gall-bladder. Appendix empty, non-adherent, mucosa thickened.

Blood-pressure 134/48, falling to minimum of 64/46 fifteen minutes after the intradural injection.

Pathology (Dr. J. H. Clark).—Bile sterile, round-cell infiltration of muscular wall of gall-bladder. Submucosa of appendix shows round-cell infiltration.

Postoperative Course.—Uninterrupted. Patient out of bed on the eighth day; discharged on the tenth day.

From the history thrown on the screen you will note that there is not only the suggestion of appendicitis, but of possible gall-bladder involvement. Therefore I feel that it is imperative not only to feel the gall-bladder, but to look at it.

When spinal anesthesia is used for a gall-bladder operation the eleventh interspace gives the best analgesia; the twelfth less; and the first still less. However, this patient is obese, and I am putting the needle in the first lumbar interspace. If necessary we will use a little gas in order to gain a sufficiently high effect. We make the injection with intermittent dilutions, rather slowly, and the very instant the hypodermic is given, the patient is laid on her back with the table inclined.

Younger patients stand spinal anesthesia better than older ones. Fat patients inspire a certain degree of timidity, since there is apt to be a deposit of fat around the heart.

The type of anesthesia used will modify your technic. If gas or ethylene is used, you will be driven to larger incisions and to muscular divisions, as well as to packing, not necessary with

better relaxation. I believe that in some operations great harm is done by attempting to use local anesthesia. For instance, in acute peritonitis, in which speed is very important, it in unwise to do a prolonged, difficult operation on a straining patient, with the intestines forcing out through the incision; and such a procedure surely increases the mortality. The operation is prolonged, and the traumatization of the peritoneal cavity is increased.

The uterus is anterior, of full normal size; the tubes and ovaries are free and negative. There is a distended sigmoid, which shows the remains of an enema. There are a few bands about the cecum. The appendix is not large, but a fatty piece of omentum is adherent to it. The foramen of Winslow is patent, and there are two large periportal lymph-nodes, suggesting infection. The liver is smooth and about two fingerbreadths above the border of the ribs. The edge is rounded. This is a young woman, and, of course, there are not the advanced liver changes seen in older people. The right kidney is of normal size, of smooth surface, but more movable than normal. The hilum is negative. The spleen is large, about three times the normal size, adherent on the anterior surface, and rather tense. The left kidney is normal on palpation.

Let us take a look at the gall-bladder. The walls are thickened, and there are enlarged periportal nodes. Before we go any further we shall take a look at the mesenteric lymph-nodes, as the patient may have a general adenopathy of the abdomen, so common in the young. There is some enlargement of the mesenteric nodes close to the spine. The stomach and pylorus are normal. This is a diseased gall-bladder and we will remove it. There are bands around the neck of the gall-bladder, which I am dividing, to expose the cystic duct carefully. We put a forceps on the duct, keeping very close to the gall-bladder, and tie the duct off. We put on a second ligature, and divide the duct between the clamp and ligature. We must next find and ligate the cystic artery. The liver, as we expose it, shows a little fibrous trabeculation, an early change that was not so apparent to my hand when I was manipulating it.

We dissect the gall-bladder from the liver. As we do this, the liver automatically starts to go back into the abdomen. It was good enough to come out for us, and this was because we had such good relaxation of the rectus muscles. After covering the bed of the gall-bladder we put a pad against the stump, so that we may see later whether there is leakage of bile or blood.

We now bring up the appendix again. This is a heavy, fatty meso-appendix. The appendix appears to be diseased. By cutting the band to the appendix at the head of the cecum, it has been possible to deliver the appendix from under the cecum. The second ligature is being used to tie it off just distal to the first ligature for safety.

QUESTION: Do you cut between the ligatures?

DR. BABCOCK: No, we cut between the clamps, distal to the ligatures. Opening the gall-bladder, we find that it is filled with dark bile, that it is trabeculated, and of the marked "strawberry" type.

QUESTION: Do you use a purse-string suture for the appendix?

DR. BABCOCK: We do not use the purse-string because it will go through Peyer's patches, and will increase the incidence of subcutaneous infection. We do the simplest thing possible—simply tie off and bind the meso-appendix over the stump.

The gauze that has been up against the gall-bladder bed shows no yellow staining of bile, and very little staining of blood; so we will close the wound without drainage.

CHOLELITHIASIS; CHRONIC SALPINGO-OÖPHORITIS WITH ADHERENT ABDOMINAL SCARS

M. S. Age thirty-three; married. Polish. Housewife.

Chief Complaint.—Abdominal pain.

Present Illness.—For three weeks continuous abdominal pain with exacerbation. No relation to food, no nausea or vomiting. Dyspnea on exertion, edema of feet on arising.

Past History.—Abdominal operations in 1917 and 1919 for attacks of lower abdominal pain, with partial relief. Return of pain since 1921. Three weeks in hospital in 1923 for rheumatism. Tonsillectomy May, 1925.

Physical Examination.—Obese woman with bubbling râles at bases, arhythmic extrasystoles. Stange test, twenty-three seconds. Uterus moderately enlarged with marked lateral tenderness. Flabby obese abdomen.

Tenderness over lower abdomen. Laboratory study: Hemoglobin 80, leukocytes 11,600, urine negative.

Anesthesia.—Novocain 1 per cent. with adrenalin locally, with ethylene oxygen.

Operation.—Excision of median vertical lower abdominal scars, abdominal exploration. Uterus enlarged and fibrous, ovaries and tubes matted together by dense adhesions. Liver smooth, moderately enlarged, edges thickened. Kidneys negative. Small gall-bladder with 33 stones, 1 impacted in neck, varying in diameter from 5 to 15 mm.

Supravaginal hysterectomy and bilateral salpingo-oöphorectomy, portion of left ovary retained.

Cholecystostomy and cholecystolithomy through 4 cm. transverse stab below ninth costal cartilage.

Blood-pressure fell from 104/76 to 94/74 under ethylene, but rose to 132/88 fifteen minutes after novocain-adrenalin injection. At close of operation it was 118/74.

Postoperative Course.—Slight cough during convalescence. Digitalized. Primary union except at point of gall-bladder drainage. Out of bed fifteenth day. Discharged, fistula closed, twenty-first day.

Diagnosis of Gall-stones.—Gall-stone colic usually is unmistakable. An obese middle-aged woman who tells of a sudden attack of indigestion at night, so severe that a hypodermic is required, and with a sense of epigastric fulness that she tries to relieve by inducing belching and vomiting, and who is nevertheless quite relieved the following day, gives truer evidence of gall-stone obstruction than any known laboratory test or method of physical examination. In such a case the *x*-ray examination may show nothing even though we poison the patient with tetrabromphenolphthalein. Yet we operate with serene assurance that stones are present.

The patient may, however, be middle aged and fat; the pain nocturnal, transient, and referred to the upper right quadrant; a hypodermic may be required to relieve pain; and a shadow in the region of the gall-bladder may appear on the *x*-ray plate. The distressing epigastric fulness and tension, however, is absent; the patient does not vomit or attempt to induce retching by putting her finger down her throat. She is pallid or even somewhat cyanotic, instead of flushed; the pulse is slow or irregular; and there may be a moderate leukocytosis. The diagnosis of gall-stones does not now fall so glibly from the tongue, for the fear of a cardiac attack, a coronary obstruction, or aortitis

is with us, and even though gall-stones are present, we would not remove them without careful reflection and a full discussion of the associated danger, with the patient or her friends. So we eagerly search for guiding signs—was the pulse unduly slow, fast, or arhythmic? Was there cyanosis or pallor, dyspnea, pain down the arms (especially the left), precordial oppression or anxiety? For how little doth it profit a surgeon to gain a gall-stone and lose his patient from coronary occlusion? And you should not forget the leukocytosis that results from myocardial degeneration. Just as we should always consider pneumonia, pleurisy, and renal colic in diagnosing acute appendicitis, and pulmonary tuberculosis in diagnosing gastric ulcer, so should we always consider circulatory disease in diagnosing biliary colic.

With a history of previous biliary colics, one of superlative degree, as Murphy was wont to say, one that endures, and shocks the patient, and requires $\frac{1}{2}$ grain, $\frac{2}{3}$ grain, or 1 grain of morphin by hypodermic to relieve the patient even partially, suggests acute pancreatitis. A resistance or mass to the left in the epigastrium, and evidence of a little free fluid in the abdomen is confirmatory. The diagnosis, of course, is proved, as the knife permits the escape of "beef broth" fluid from the abdomen, and reveals the yellowish-gray points of fat necrosis in the omentum and mesentery.

Cholecystectomy and Cholecystostomy.—Always record the condition of the liver in operating upon the biliary tract. Is it large, smooth, fatty, thick edged; is it shrunken or senile, with sharp edges and fibrous trabeculation; is it firm, fibrous, roughened, or nodular; or is it swollen, dark, mottled, "nutmeg" from passive congestion? Are there changes in the capsule or substance? How does the left compare with the right lobe? What is the condition of the liver adjacent to the gall-bladder? In special cases shall I not take a minute slice, 2 mm. thick, close the trifling gap by a stitch, and make a microscopic study of the section? How can I forecast the future of a patient after cholecystectomy if I know nothing as to the hepatic function? The salutation in biliary surgery should be "How is your liver?"

When a patient comes to you with distress after a cholecystostomy, bewailing the fact that the gall-bladder was not removed, do not criticize the previous operator; interrogate the liver. Remember what a large percentage of patients continue to have symptoms after removal of the gall-bladder. Try to correlate your late results after these operations with the pathologic change found in the liver at the time of operation. It is the liver-gazer,

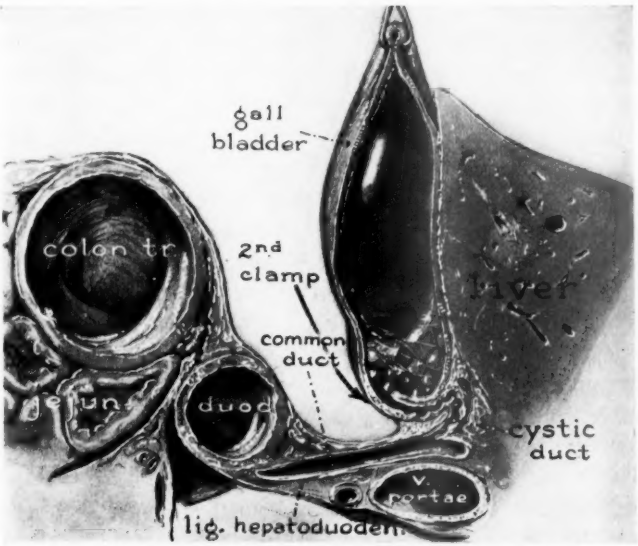

Fig. 15.—Cholecystectomy: The forceps, which apparently grasps the overhanging lower portion of the gall-bladder, frequently has instead the beginning of the cystic duct, as shown in the illustration. Or, if the lower end of the gall-bladder is not carefully raised and closely followed, it is quite easy to damage the common bile-duct.

not the crystal-gazer, who casts the horoscope of these patients. A liver that has been degenerating for fifteen to twenty years will not be restored to its pristine function by the removal of the gall-bladder. Many of these degenerated livers are better treated by an 'ostomy than an 'ectomy. Until we develop a reasonable promptness and operate three to five years, instead

of fifteen to twenty-five years (as we so frequently do) after the inception of biliary disease, we should not expect perfect post-operative results.

It is not cowardly for a surgeon of moderate facility to avoid cholecystectomy; rather it often indicates good judgment. I show my assistants how easy it is to remove the gall-bladder, and two soon have the unpleasant experience of cutting the common duct (Fig. 15). I show an associate how well patients do after cholecystectomy without drainage, and he loses his next patient from seepage of bile into the peritoneal cavity. My example is bad. A colleague restricts himself absolutely to cholecystostomy, and his results compare very favorably with many of the rest of us who do not so well appreciate our personal limitations. What a flood of unpublished catastrophes—damage to ducts, deaths from hemorrhage, peritonitis from bile leakage—have followed the removal of the gall-bladder; and not alone at the hands of the novice or surgeon of limited skill. Although excision remains the chief operation for gall-bladder disease, it always should be done with meticulous care. With advanced degeneration of the liver, in acute gangrenous or purulent inflammation of the gall-bladder in the old and cachectic, a simple 'ostomy, usually under local anesthesia, should be substituted. 'Ostomy should carry the mortality of the grave risks; 'ectomy should have the lesser mortality. If your facilities, your light, your anesthesia, your assistance are poor, better undertake a safe cholecystostomy than do a bungling and dangerous cholecystectomy.

Gradual Decompression of the Liver.—If the common duct has been tied or obstructed by stone for several weeks, the continued biliary congestion has produced serious changes in the liver. Probably all of you have observed the violent and often fatal cholemia that follows the sudden escape of the dammed-back bile. It is like the renal congestion and uremia that follow the emptying of the greatly overfilled urinary bladder. You may be interested in the expedient we have used to overcome the obstruction gradually. It is simply an adaption of McGraw's elastic ligature, or Maury's string ligature for gastro-enterostomy,

to biliary surgery. A small round needle is used, and the thread should be strong and relatively large so as to fill the needle holes. The needle is carried in and out of the gall-bladder, and then in and out of a contiguous portion of the duodenum or stomach, each bight to include a centimeter or more of the viscus.

Fig. 16.—Cholecystectomy: The relationship of the parts when the apparent overhanging of the neck of the gall-bladder is raised. The importance of exposing the cystic duct close to the point of the application of the second clamp is evident.

The ligature is tightly tied and the area surrounded by a fine continuous seroserous suture, the posterior line of which was placed before the ligature was introduced. The ligature slowly cuts a new stoma between the two organs, and the bile is gradually and progressively drained into the intestinal canal. Should

it be desirable later to remove any residual stones, this may be done with one-fifth the risk that would have attended their primary removal.

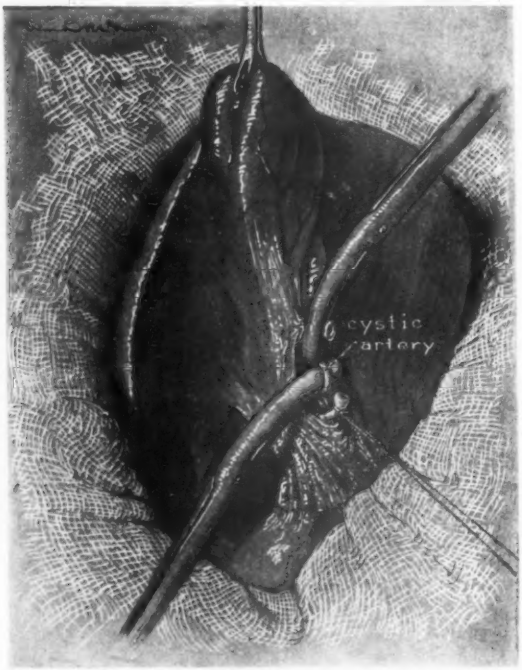

Fig. 17.—Cholecystectomy: The cystic duct is best exposed by sharp dissection with the scalpel. It should not be clamped until it has been clearly isolated close to the gall-bladder. The cysticus has been doubly ligated below with 0 chromic catgut, grasped by forceps above, and divided between the forceps and ligatures. The cystic artery is now exposed close to the gall-bladder, usually above and to the left of the duct. A tortuous artery in this region should be approached with caution, since it is probably the hepatic artery, which, of course, should not be divided. By careful exposure with sharp dissection carried close to the gall-bladder wall anomalous bile-ducts and the hepatic artery are best avoided.

Of course we will not forget to prepare the patient with chronic jaundice by intravascular injections of calcium chlorid—the plan of the Mayo Clinic.

Perhaps the patient after an operation upon the gall-bladder has a persistent biliary fistula. In the early days after the operation, while the tissues about the wound are inflamed and undermined, do not make the mistake of reopening the abdomen and resuturing, for sutures will not hold, and the subsequent

Fig. 18.—Cholecystectomy: Separation of the gall-bladder from its bed and the liver with follow-up closure of the peritoneal edges by a continuous fine catgut suture. As a rule we consider separation by a sharp scalpel preferable to that by scissors.

condition of the patient will be worse instead of better. Stimulate granulation by the occasional application of iodin in, but not around the wound; occlude the opening by a light packing of gauze impregnated with balsamics (balsam of Peru, or compound tincture of benzoin); and prevent ulceration of the ad-

jacent skin by keeping it exposed to the air and dredged with a stearate of zinc powder that has been tested on gauze and proved to have water repelling qualities. Give bile by capsule or pill to compensate partially for that which the patient is losing. Often, after several weeks of discouraging dressings, the flow of bile from the wound suddenly and spontaneously stops, to the great relief of the patient and the surgeon. Again the wound heals with a chronic biliary fistula that has well-organized walls. If all of the bile escapes in this way, the condition grows more serious as the months go by. As with chronic jaundice, the continued loss of bile undermines the patient's resistance, and he will likely die if any elaborate operation is attempted. If the gall-bladder has not been removed, expose it, and with the least possible manipulation or exposure anastomose the leaking end of the gall-bladder to the most convenient contiguous portion of the duodenum or stomach, with two rows of fine chromic catgut sutures. Then close the overlying wound with perhaps a small cigarette drain, which may be very temporary. If the gall-bladder has been removed, carry your incision about the fistula, and carefully isolate without invading this little tube until a sufficient length has been freed to be carried through a minute buttonhole made in the adjacent duodenum or stomach. Make the anastomosis bile-tight by suture, and drape some omentum about the line of anastomosis. After having used this simple method with much satisfaction, I was interested to learn that Lahey also had found it valuable.

Do not attempt to explore or remove any associated gall-stones until the patient has regained resistance from his prolonged loss of bile. The preliminary staining of the fistula with a solution of an antiseptic dye gives a useful guide in liberating the fistulous tube.

A NEW OPERATION FOR ANEURYSM OF THORACIC AORTA PERFORATING RIGHT ANTERIOR THORACIC WALL

C. S. Age fifty-four. White male. Automobile mechanic.

Diagnosis.—Large aneurysm of ascending aorta perforating anterior thoracic wall.

Present Illness.—Began January, 1925 with pain and palpitation in the upper right chest, increasing until each heart beat gave an agonizing throb of pain. The pain was worse at night, and a pulsating mass appeared in the upper right chest.

Past History.—Usual diseases of childhood. Denies venereal, but had iritis in 1917. Moderate user of alcohol, tea, and coffee.

Family history negative.

Physical Examination.—Well developed and nourished; slight cyanosis; distention of veins of neck. Double mitral and systolic aorta murmurs; left border of heart nearly to anterior axillary line, right border cardiac dulness at right midclavicular line. Protruding tender mass with expansile pulsation about 7 cm. in diameter below clavicle over second and third ribs, right side. Reflexes negative. *x*-Ray, large saccular aneurysm, almost filling right upper chest.

Patient was admitted on July 22, 1925; treated by rest and iodids; discharged August 3, 1925, unimproved. Readmitted to Medical Ward August 28, 1925, and transferred to Surgical Service on September 14, 1925.

Operation.—September 21, 1925.

Anesthesia.—Narco-local anesthesia.

Operation.—Twelve cm. transverse incision above inner half of right clavicle, sternomastoid divided. Internal jugular vein found enormously dilated. Distal ends of internal jugular and common carotid ligated, proximal ends anastomosed end to end. Wound closed in layers without drainage.

September 22d: Chilly, cough with expectorations of thick blood-stained mucus.

September 23d: Vomiting, precordial pain, pinched expression, circumoral pallor, sense of impending death, involuntary bowel movements. Pulse 90, soft, good volume, water-hammer type. Blood-pressure 145/50. After this the patient rapidly improved, the systolic blood-pressure varying from 100 to 120 up to the day of his leaving the hospital.

Postoperative Course.—January 12, 1926: For the past month the patient has been at work in an automobile service station.

Electrocardiographic (Dr. Joseph B. Wolffe) and *x*-ray studies (Dr. G. C. Bird) show a slight decrease in the size of the aneurysm, and a slight increase in the size of the heart.

The general circulation, definite improvement with increased amplitude in all three leads.

The left ventricular preponderance has been retained.

"During the past three months there has been a definite but slight decrease in the aneurysmal pulsation" (Dr. Wolffe).

Pain and insomnia relieved.

Since Wardrop tied the carotid artery for thoracic aneurysm, one hundred years ago, surgeons have aimed to slow the current and to stimulate the formation of clot in the sac. The results of these operations have been, for the most part, dis-

couraging, and from a hydrodynamic point of view unsound. To reduce the velocity of blood in a vessel is but to increase the pressure on the wall of the vessel. It is not surprising that aneurysms have burst after ligation, for even a proximal and distal ligation may, through collateral branches and retardation

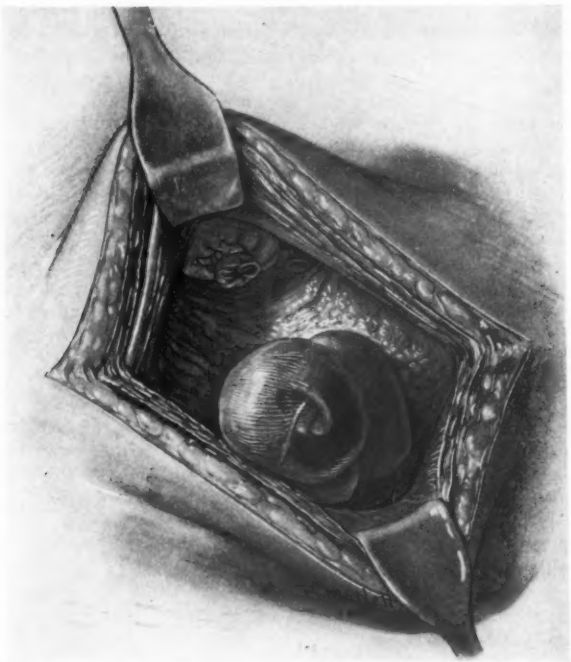

Fig. 19.—New operation for thoracic aneurysm: The common carotid artery and internal jugular vein on the right side have been divided and the cephalic ends ligated. An end-to-end anastomosis has been made between the internal carotid and the enormously enlarged internal jugular to decompress the aneurysmal sac.

of flow, be followed by increased pressure on the aneurysmal wall. Halstead noted the dilatation of the artery distal to the point of constriction by his aluminum band.

Instead of attempting to reduce the current through the sac, or to favor clot formation, I have dreamed for years of the pos-

sibility of dropping the intravascular tension by increasing the velocity of the blood through the sac (Fig. 19). A few months ago this patient presented himself in sufficiently desperate plight from an enormous and very painful thoracic aneurysm perforating the chest wall, to justify a trial of the principle. We produced in effect a large leak from the aneurysm back to the right heart, much as if we collapsed a Scotchman's bag-pipe by cutting a hole in the bag. The operation consisted in dividing the internal jugular and the common carotid in the neck, ligating the distal ends, and then doing an end-to-end anastomosis of the proximal ends (Fig. 20).

The patient has been relieved of the severe pain and insomnia, and is symptomatically much improved since the operation. As

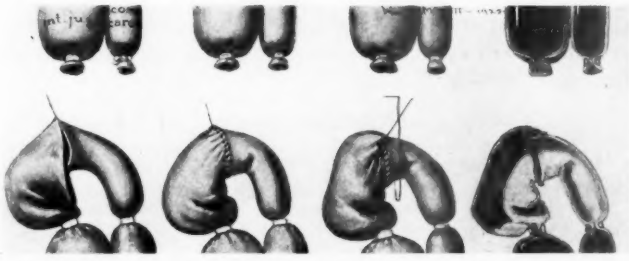

Fig. 20.—New operation for thoracic aneurysm: Diagram showing the end-to-end anastomosis between the common carotid artery and the internal jugular vein for the decompression of the large aneurysm of the aorta.

the man goes among you, if you will palpate the neck just above the right clavicle, you will feel the strong bruit where the blood from the carotid turns and rushes back into the jugular and descending cava. There is no enlargement at the anastomosis; and the enormously distended veins of the right side of the neck have collapsed since the operation.

Perhaps you recall the disastrous effect of a spontaneous lateral perforation of an aneurysm of the base of the aorta into the descending vena cava—the tremendous venous engorgement of the upper half of the body which follows, usually with death in eight or nine days.

Fortunately our end-to-end anastomosis produced a very different effect from the side-to-side union—an effect on the vein suggesting the tubes of Venturi or an aspirating pump. After the anastomosis the enormously dilated jugular vein was at once collapsed to one-third its previous diameter by the negative pressure produced on its walls by the swift flowing arterial blood.

Many physiologic and hydrokinetic problems are suggested by this operation—the effect on the right heart, on the liver, on the rate and force of cardiac contractions, and the influence of the double oxygenation of a part of the blood. In this patient the blood-pressure seems to have been distinctly reduced, more so in the left arm than in the right. The electrocardiogram shows the maintenance of the left ventricular preponderance.

I have been debating whether an operation of this type might not be of value in increasing the circulation of the right heart in certain forms of cardiac disease, with obstruction in the lesser circulation.

PILONIDAL SINUS

H. C. Male, aged twenty-five years. White; married; American; clerk.

Chief Complaint.—Sinus over sacrum.

Present Illness.—Irritation over sacrum for twenty-six months. Sinus cauterized eight months ago, with relief for six months. Discharge and itching for past six weeks.

Physical Examination.—Indurated area over lower part of sacrum with discharge, opening over coccyx.

Laboratory Study.—White blood-cells 18,100.

Anesthesia.—Stovain 6 cgm. in third lumbar interspace.

Operation.—Sinus filled with saturated zinc chlorid followed by an ethereal solution of methylene-blue, and freely excised *en bloc.* Closed without drainage with silkworm-gut and horsehair.

Pathologic Report.—Sinus about 4 cm. deep, lined with epithelium and containing sebaceous material and fine hairs.

Postoperative Course.—Secondary hematoma in wound evacuated, and space filled slowly by granulation. Patient discharged on the eleventh day.

Most troublesome and persistent are the hair-containing sinuses in the sacrum. Complete eradication is essential to cure, as the leaving of an area containing hair-follicles and epithelium is followed by recurrence. Delineate the sinus by injecting with strong ethereal solution of methylene-blue as a guide, to insure

complete excision. It is often wise to precede this by an application of a saturated solution of zinc chlorid to sterilize the wall of the sinus. The adjacent tissues are dense and vascular, and a secondary hematoma will form unless the greatest care is taken with the hemostasis. In many cases time would be saved by a secondary suture.

EPIDIDYMITIS. TIC DOULOUREUX

P. V. Male, aged fifty. White; Greek; married; storekeeper.

Chief Complaint.—Neuralgia second branch fifth nerve, left. Subacute epididymitis.

Present Illness.—One year ago after exposure to cold developed severe pain in left side of face, for which all of teeth were extracted, with little relief. Mastoid antrum was drained, with temporary relief.

One month ago injection of alcohol in inferior orbital notch. Recently development of pain in first branch left at supra-orbital foramen, for which an alcohol injection has been given. Two weeks ago a mass was noticed in the right epididymis.

Past History.—Gonorrheal and syphilitic infection five years ago.

Family History.—One brother died insane.

Physical Examination.—Of spare build, but well developed. Tenderness over left infra-orbital foramen. Firm mass about 5 x 2 cm. attached to right testicle, but not to skin; not painful on pressure.

Laboratory Study.—White blood-cells 10,000. Wassermann negative. Urine negative.

Anesthesia.—Stovain 5 cgm. in second lumbar interspace.

Operation.—Epididymectomy and castration. Double ligation of cord with catgut. Suture of scrotum with horsehair. Injection of 2 per cent. phenol into left infra-orbital foramen.

Blood-pressure 136/88 before operation, falling to 48/? in fifteen minutes.

Pathologic Examination.—Testicle normal. Epididymis dense, fibrous, with multiple abscesses, with P. M. N. and without tubercles. Fibrous obliteration of vessels. Acute suppurative epididymitis.

Postoperative Course.—Union by first intention. Tic douloureux relieved. Discharged on thirteenth day.

It is my impression that the injection of a 2 per cent. solution of osmic acid in the exposed nerve trunk produces much more destruction and a more effective dense fibrous tissue block to nerve regeneration than does alcohol, but alcohol usually affords relief for from six months to three years, and the injection may be repeated in one's office. As this patient had an injection of alcohol only a few days ago, we will at this time merely reinforce

it by injecting the weaker phenol solution. If the distribution of the pain is quite limited, I usually make the injection at a peripheral foramen—the mental, inferior maxillary, infra- or supra-orbital—reserving the injection of the foramen ovale or rotundum for a time when the more peripheral injections fail. With recurrence, repeated injections at the same point may prove less effective. While osmic acid may permanently destroy motor conduction, alcohol gives a motor paralysis of about six weeks, and a 2 to 5 per cent. solution of carbolic acid, a motor paralysis of about ten days. Of course, alcohol is the preferred injection for severe neuralgia, but for the milder and more superficial form, an injection of weak phenol solution is often effective and causes little damage. In tic convulsion carbolic acid relieves the spasm with a very transient motor paralysis, and I know of no simpler or better treatment for the condition.

In removing the epididymis the involvement of vessels of the cord is such that a castration is done. In a younger patient every effort would be made to save the testicle, or to leave a substitute for its cosmetic effect. Such a substitution, especially if unknown by the patient, may, however, lead to later complications. For example, some years ago, by arrangement with the parent, and under guise of an operation on the brain, I substituted for the testicles two carefully molded masses of paraffin. The patient was a boy of degenerate and criminal tendencies. A single small concealed incision was made and closed by fine absorbable suture; and, as was desired, the patient had no suspicion of the interchange. In an institution where the boy has since been confined the surprising "induration of the testicles" has aroused the question of a serious or unusual disease in the mind of the medical examiner. I am fearful that some unsuspecting surgeon may yet feel impelled to castrate this patient again.

CHOLECYSTITIS, CHOLELITHIASIS, RELAXED ABDOMINAL WALL, AND INTRA-ABDOMINAL ADHESIONS

E. S. Female, aged thirty-three. Married; housewife; 3 children.

Chief Complaint.—Transient nocturnal attacks of severe abdominal pain with nausea.

Present Illness.—First attack began at midnight in July, 1924, and lasted two days, nausea without vomiting. July, 1925, similar attack, radiating to right shoulder with vomiting last two days. Two weeks ago third attack referred to upper right quadrant with nausea and belching.

Past History.—In 1914 appendectomy and removal of fallopian tube.

Physical Examination.—Very obese woman with much relaxed abdominal wall. No areas of tenderness except on deep palpation in right upper quadrant.

Laboratory.—Blood and urine negative.

Anesthesia.—Stovain 6 cgm. in twelfth lumbar interspace.

Blood-pressure 126/82, falling to minimum of 56/? fifteen minutes after the intradural injection.

Operation.—Lipectomy, vertical of skin and fat measuring 40 x 20 cm. Abdominal exploration. Cholecystectomy. Separation of adhesions. Correction of diastasis by interdigitation. Liver smooth, moderately enlarged, with rounded edge.

Gall-bladder whitish, thickened, not enlarged, adhesions on under surface, slight enlargement of periportal lymph-nodes. Foramen of Winslow open, ducts not enlarged.

Gall-bladder shows marked strawberry change with calcified papilloma projecting from mucosa. Bile dark brown and thick. Right kidney one and a half times normal size; smooth, negative, hilum, well supported. Left kidney negative.

Left ovary and tube absent. Uterus slightly enlarged and right ovary shows follicular cysts. Appendix has been removed. Wound closed in layers without drainage and with wide interdigitation of aponeurosis.

In this case, in concluding the cholecystectomy, I am sewing together the edges of the peritoneal reflections that partially covered the gall-bladder. The gauze that has been against the liver bed shows no bile or blood staining, and so we feel safe in closing without a cigarette drain. We are very glad of this, as we desire to retrench and reinforce the thin and relaxed anterior abdominal wall. Of the alien supports buried in the abdominal wall, I think fine silver lorgnette chain is the best. When broken in the tissue, the link ends are so short that they do not perforate tissue as do the wire ends of silver filagree. Both chain and wire will break when embedded in the abdominal wall, but the chain is more flexible; tissue grows through the links; and breaking of the chain in segments does not destroy the support afforded. The ordinary lorgnette silver chain costs about 30 to 50 cents a yard, and if of a good alloy, is almost as strong as catgut of the same size. The lantern slide shows 5 yards of

silver chain, lacing together the abdominal wall after a destructive gunshot wound. The efficiency of the support is shown by the fact that this patient was afterward passed as qualified for overseas service.

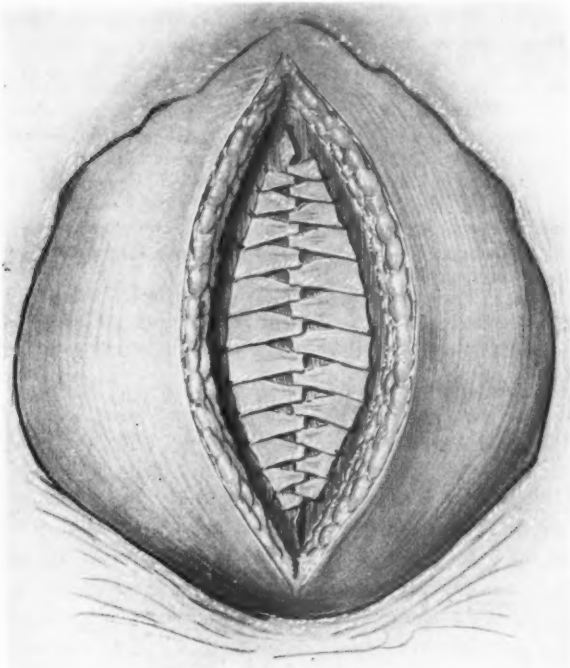

Fig. 21.—Interdigitation of fascia in the treatment of diastasis of the recti for large abdominal hernias. The peritoneum with the edges of the recti on the margins of the hernial opening are first united, and the redundant aponeurosis, or the hernial sac, split into ribbons, which are interdigitated, and fastened into position by suture. This gives a very strong support to the weak abdominal wall.

The gross examination of the gall-bladder shows a small calcified papilloma, such as is not infrequently seen in chronic cholecystitis.

Proceeding to the next stage of the operation, we take the two flaps of peritoneum and aponeurosis that have been turned back from the edges of the recti, and cut them into ribbons, making the ribbons about 1 cm. wide. We carry the ribbons of one side over to the opposite side, interdigitating and producing the effect of clasping your hands with interlacing of the fingers (Fig. 21). The ribbons are held in place by interrupted sutures of chromic gut. We will be able to give the patient considerable support, so that the intra-abdominal organs will be held in place by atmospheric pressure, much as water is supported in an inverted tumbler when a piece of tissue paper covers the surface of the water. The patient is comfortable and conscious—she is talking to the anesthetist.

This needle-holder releases the needle as soon as the hand is relaxed; a complicated needle-holder is a source of much lost time. The stitches bring the ribbons together so well that now they run almost edge to edge. The peritoneal surface is down. I believe it was Spencer Wells who found that the interposition of peritoneum in closing the muscle walls gave a much stronger closure. We are gaining the benefit of this by the interdigitation.

QUESTION: What catgut are you using?

DR. BABCOCK: No. 2 chromic. The makers of this catgut, however, grade it up and down to a size so that a large No. 1 is almost the same as a small No. 2. This is a small No. 2.

The interrupted silkworm-gut sutures through the skin and fat are tied over dental cotton rolls. If the stitches are too tight, we merely pull out a part of the underlying cotton roll. This is like the old quilled suture, except that softer rolls are substituted for quills.

Pathologic Report (Dr. Clark).—Bile sterile. Gall-bladder mucosa slightly hypertrophic and desquamating with rather dense infiltration of round cells in the muscular coat.

Postoperative Course.—Union by first intention. Satisfactory convalescence, except for some bladder irritation. Discharged sixteen days after operation.

DEPRESSED NOSE FOLLOWING SUBMUCOUS RESECTION

L. A., aged twenty-five. Male. White, single American. Secretary.

Present Illness.—In 1908 accidentally fractured nose, with secondary nasal obstruction. In 1916 again fractured while playing football. In 1918 endonasal operation with submucous resection, followed by relief from obstruction, but progressive flattening and broadening of lower half of nose.

Physical Examination.—Robust young man with flattening of lower end of nose.

Anesthesia.—Local; procain 1 per cent. with adrenalin 1 : 60,000.

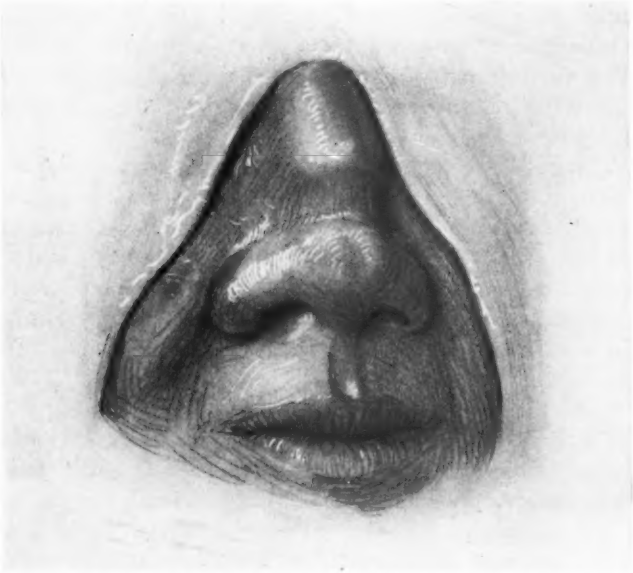

Fig. 22.—Saddle-nose from submucous resection previous to implantation of costal cartilage.

Operation.—(*a*) Vertical incision 1½ cm. long in wrinkle line at inner edge of left eyebrow. Blunt ended scissors introduced and skin separated from framework of nose to tip. (*b*) Section of seventh right costal cartilage removed, contoured, and carried through incision to tip of nose, raising unsightly depression. Wound closed with fine horsehair, and also silkworm-gut for thoracic wound.

Here is a deformity of the nose resulting from too extensive resection of the septal cartilage.

The problem of correcting nasal defects is very old, and came with the use of the sword and scimiter. You will note in the

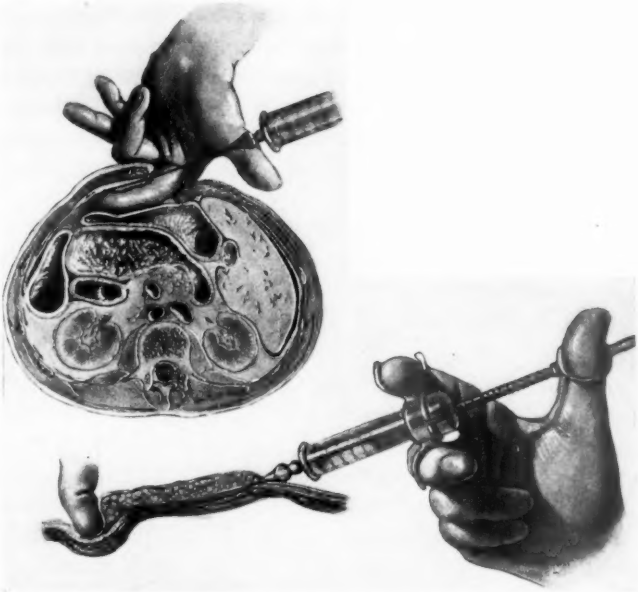

Fig. 23.—Induction of local anesthesia by pump syringe. The needle is fixed by a bayonet catch so that it will not become detached, and the piston contains a valve so that the syringe automatically refills when the piston is withdrawn. A rubber supply tube connects with the hollow thumb-piece. With this 5-c.c. syringe a solution of a local anesthetic can be very rapidly and accurately injected with little fatigue. The inset shows the infiltration of the skin. The upper figure shows the method of producing anesthesia of the peritoneum around the wound. A small incision is made through the peritoneum; then, guided by the finger introduced into the peritoneal cavity, the needle is introduced into the preperitoneal space, which is widely and freely infiltrated with from 50 to 200 c.c. of a 1 or ½ per cent. solution of procain. This deep infiltration is very valuable in producing relaxation of the abdominal wall adjacent to the wound.

examples of old armor that important addition to the helmet—the nasel. Rhinoplasty always recalls poor Tagliacozzi, who devised the Italian operation, and as a result his poor worn body

was cast out of the consecrated ground. His operation was a profanity, and his body anathema—a warning to would-be plastic surgeons.

I remember that, when I was a student, Dr. Keen successfully reconstructed a saddle-nose by embedding a hollow gold-plated capsule of silver carefully made to form. We have had the epidemic of paraffin injections which for a time seemed so valuable. But paraffin finally slumps and increases the deformity, the overlying skin is reddened, and sometimes suppuration occurs.

In working with local anesthesia the great danger, of course, is from the injection of a blood-vessel. But by pulling the piston back before each injection we make sure that an intravascular injection is not produced. This little pump syringe is very effective (Fig. 23).

The incision is made through the wrinkle line near the eyebrow, and leaves an inconspicuous scar (Fig. 24). We use a small needle to reduce pain, and then remember that it is only necessary to hurt the patient once, if after the first injection, the needle is only moved in tissue that has previously been injected. It is important to be honest with the patient, and to tell him candidly what will hurt and what will not, thus obtaining his confidence and co-operation.

The skin is now beginning to raise from the bone. We will now anesthetize an area on the right side of the chest, incise along the line of skin cleavage, and remove a measured portion of costal cartilage for transplantation.

Toxic effects from local anesthesia are rare if large amounts of dilute solutions of procain are used. I have never seen any serious effect from the use of 200 to 600 c.c. of 1 per cent. procain, which we often employ. The patient's blood-pressure is, of course, raised and the patient is stimulated.

The costal cartilage has now been removed and contoured. The upper edge should be perfectly straight. Accurate contact throughout the length of the lower edge is not essential. The cartilage readily slips down from the little wound in the forehead to the cavity prepared under the skin of the nose by blunt separation

with narrow Mayo scissors (Fig. 24). I believe the bridge of the nose is now a little higher than we need to have it, so will remove the cartilage and shave off a small bit of the under surface. The cartilage is now reintroduced to the very tip and stays in midline. I hope there will be sufficient spring to raise the tip of the nose permanently. Of course, because of the local infiltration, the nose is broader now than it will be after the procain

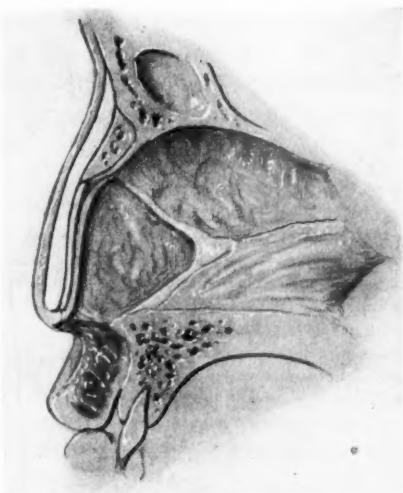

Fig. 24.—Portion of costal cartilage introduced through an incision in a wrinkle line of the forehead. A piece of transplanted cartilage was introduced through a median incision in the columnella.

solution has been absorbed. You will note the distinct improvement.

With a saddle-nose, great care should be taken to separate the skin thoroughly, well down on the sides of the nasal bones; otherwise the tension of the skin on the transplant of cartilage may lead to a slough. I have not known of infection when the cartilage was introduced from the forehead; but years ago an infection followed the introduction of the cartilage through the columnella.

No vessels require ligation and the little incision in the forehead is accurately united by interrupted horsehair sutures.

Postoperative Course.—Primary union, patient discharged on the fifth day. The cartilaginous implant proved insufficient to support the tip of the nose fully. A vertical incision was therefore made through the columnella and a section of the cartilage graft used to replace the absent septum, and to raise the tip of the nose. The flaring alæ were retrenched by sections through the cartilage by incisions within the nose. Primary union.

INTRA-ABDOMINAL ADHESIONS. CHRONIC CHOLECYSTITIS

M. C. White female, aged twenty-two; married, housewife.

Chief Complaint.—Sharp pain in right lower quadrant. Dysmenorrhea, slight menorrhagia.

Present Illness.—Since July patient has had severe pain in right lower quadrant during menses. In September continued to flow for some time, spotting. Pain then was referred to back. No nausea or emesis.

Past History.—Diphtheria in childhood. Menses regular. Married two years. One pregnancy full term. Operated in December for ovarian cyst with twisted pedicle and acute appendicitis. Recovery uneventful, and patient went home in ten days.

Physical Examination.—Very obese young woman. Tenderness and plus tension in upper right quadrant, area of tenderness about 2 inches from umbilicus toward right spine upon deep pressure.

Laboratory.—Blood and urine negative.

Anesthesia.—Ethylene oxygen, novocain. (Patient very nervous; insists on unconsciousness.)

Operation.—(*a*) Pfannenstiel incision with excision of old scar. Separation of firm adhesions over region of previous ovarian cyst. Left ovary cystic from large degenerated corpus luteum, resected. Uterus freed. Right pedicle negative. Incision closed in layers.

(*b*) Gall-bladder very large and tense; bluish wall, bile thick and dark brown; no stones. Transverse upper right rectus incision. Cholecystectomy, one small cigarette drain.

This very nervous patient, as you notice, is pleading for gas, and so we shall let her have it. She is twenty-two years of age, married, and has been brought here because of intra-abdominal adhesions. Since last July she has had severe pain in the right lower quadrant without nausea. She has been married two years, with one full-term pregnancy. She was operated on in December for ovarian cyst with twisted pedicle. You can see

the scar of this operation. The cyst removed at that time was very large. For some reason she has nausea and tenderness in the right lower quadrant, without much thickening; these have increased so much lately that she has had to come into the hospital. Whether there are some adhesions that have followed the operation, or whether some other condition exists, I am not prepared to say, as the condition has been so persistent. She is highly nervous; after two hypodermics, of $\frac{1}{6}$ gr. morphin and 1/100 gr. scopolamin, she was still so nervous that she was later given another 1/100 gr. of scopolamin. To give this type of patient local anesthesia effectively we must further reduce the cortical sensibility.

With ethylene we have a degree of rigidity, and so for relaxation we will block the deeper motor nerves with procain. I will excise the old scar first. From ethylene the blood is a little darker than in spinal anesthesia. When the blood becomes dark under spinal anesthesia, call for help at once. It is well to be a little apprehensive in any anesthesia if the blood becomes dark. It is unfortunate to have a patient begin the operation in a high state of nervous excitement, because there is apt to be difficulty in inducing anesthesia, with consequent rigidity and a tendency to cyanosis during operation.

We will use the old incision, not because it is convenient, but because we do not feel justified in giving the patient two scars. So we will put up with a little inconvenience (Figs. 25, 26). Let us put the hand in, and determine if there is any reason for this patient's symptoms. In the first place, the old inflamed cyst with the blood that escaped from it has produced severe peritoneal irritation. The great omentum is very adherent over the anterior abdominal wall. The left ovary has a little corpus luteum cyst. The right ovary, of course, is absent. The patient's reactions are extreme. She is nauseated under the ethylene. The uterus is entirely free and there is nothing wrong with the right pedicle. There is a large, very tense gall-bladder, an acute cholecystitis. We shall close this transverse incision after looking at the separated omentum and the ovary to see that no bleeding point has been left; and then we shall go above and try to take care of

the gall-bladder. I am quite sure that we examined the gall-bladder in December and found no evidence of trouble.

This patient was not a good subject for ethylene, and is fighting the anesthetic every inch of the way.

The next problem in this case is to select an incision which will suit the anesthesia. In gall-bladder operations under spinal anesthesia we have used a vertical incision. It has been very easy to expose the gall-bladder without division of the rectus

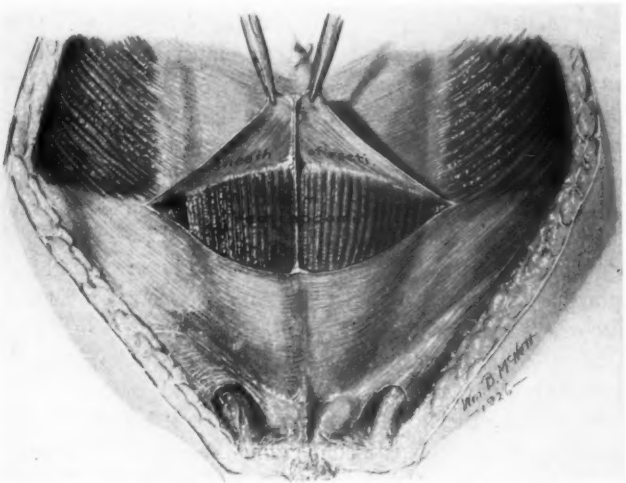

Fig. 25.—Pfannenstiel incision, showing liberation of sheath of recti by division of fibrous partition between the muscles. The anterior sheath has two layers, the fibers of which are not handled. We prefer to divide and unite each layer separately to avoid cutting the individual fibers.

muscle, but under spinal anesthesia we have excellent relaxation. Here we have a patient who is very rigid, and so, just as under a local anesthetic, where the anesthesia is not complete, we must select a suitable incision. With a transverse incision across the right costal border, the more the patient strains, the better the liver will be delivered.

Before we divide the rectus muscle, we take a suture and fasten the muscle to the sheath, so that it will not retract when

divided; and so it may later be sutured without difficulty. Going above to the upper part of the sheath, I do the same thing. We cut the muscle and fascia transversely, and enter the peritoneal cavity. If we can manipulate it rightly, we will make the patient help us in delivering the gall-bladder. The gall-bladder here is so dense and big that it is difficult to bring it up through the incision. As the patient strains, we must be very careful

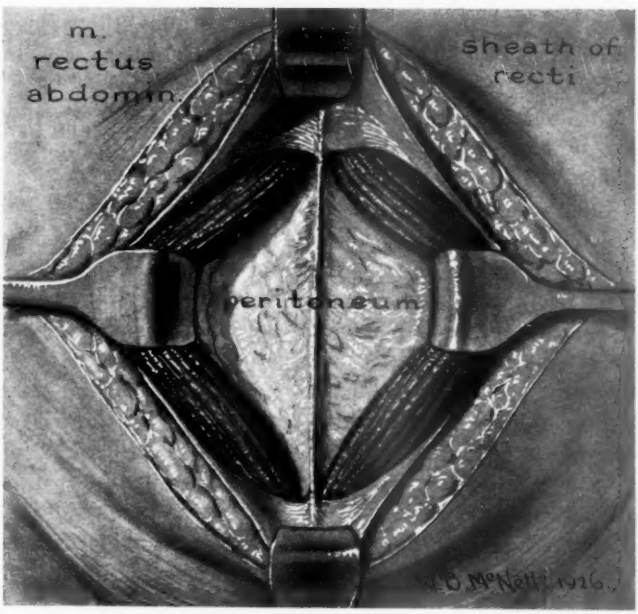

Fig. 26.—Pfannenstiel incision, showing exposure of peritoneum for vertical incision.

with our retractors, for fear of tearing the hepatic artery or portal vein. We will guard the ends of the retractors with gauze. The gall-bladder is so tense that I am afraid we shall have to aspirate it. It is a smooth gall-bladder, large, and distended right down to the very neck.

While we are waiting for the aspirating syringe I will explore. The foramen of Winslow is open. I feel no stones or thickening

of the ducts. It is apparently only a gall-bladder greatly distended at the neck, because of some unknown cause. The bile is a dark brown. With the distention gone, we catch the neck of the gall-bladder, and find ourselves upon the cystic duct. This is very large here and very small below. I doubly ligate the cystic duct as in each preceding case, thus avoiding leakage, should one of the ligatures slip. I catch, divide, and tie the cystic artery, along which there is an enlarged gland. As the diaphragm is rather high, the more she strains, the wider she pulls the incision. Despite the difficult anesthesia, she is in good shape.

One advantage of the transverse incision is that it is easier to close than the vertical incision. We shall put in a cigarette drain.

It is very disheartening when you have a troublesome operation, and the wound has been closed, to find a sponge missing. You may feel sure that there is not a sponge inside, but you do not feel quite happy about it, and so are very certain to reopen. We have had a number of patients reopened, only to find that the sponge had fallen on the floor or been carried away while we were working. So we started tying the sponges together in order to have a better check on them. It is very satisfying to have the sponges all hanging on one cord. We tie ten sponges on a string, counting them each time to see that none have been detached.

Postoperative course uninterrupted. Primary union. Patient out of bed on the fourteenth day, and discharged on the nineteenth day.

SUSPECTED BRAIN TUMOR

M. O'Sh.; white female, age forty-five; married.

Chief Complaint.—Repeated attacks of unconsciousness with Cheyne-Stokes respiration, convulsions, vomiting. Violent headache, attacks of vertigo. Involuntary urination and defecation. Dimness of vision. Papilloedema and retinal hemorrhage, edema of extremities.

Present Illness.—Repeated attacks of unconsciousness with convulsions, mainly left sided.

Past History.—Convulsions with headaches, vertigo and vomiting in the intervals. Progressive diminution of vision over a period of almost two

years. Now has varying degree of stupor with a tendency to be facetious, supercilious, and witty. Has a left hemiparesis and choked disk. Eight years ago fell from second story window striking head on occipital region. *x*-Ray negative, November 1, 1924. Progressive weakness.

Physical Examination.—Patient brought in unconscious. Marked Cheyne-Stokes respiration. Right pupil dilated and does not react. Left slightly irregular and reacts to light. Left extremities very rigid, but not on right. All reflexes 2 plus on left. Spinal pressure 10 raised to 26 by compressing carotids. Ankle-clonus left. Liver two fingers below costal margins.

Laboratory.—Urine trace of albumin, numerous hyaline casts. Wassermann negative. White blood-cells 15,150.

Anesthesia.—Procain adrenalin 1 per cent., 125 c.c.; morphin, grain 1/6 and scopolamin, grain 1/200, by hypodermic.

Operation.—Coronal incision right. Temporal muscle plus separated, subtemporal decompression. Brain and cerebrospinal fluid appear to be normal, little increase in pressure.

Special Test.—Phenolphthalein test, 12.5—9²—20 per cent.
20 15 5

Sugar, 100 per 10 c.c. of blood.
Urea, 0.019 gm. per 100 c.c.
Uric acid, 2.1 mg. per 100 c.c.
N. P. N., 46 mg. per 100 c.c.

The next patient is a middle-aged woman who has had a sense of great pressure in her head for months, and has been in a semistupor for some time. Dr. Bochroch has located the trouble as a tumor of the right parietofrontal region. While the patient seems to be in a nearly hopeless condition, we shall explore and at least do a decompression, with the rather forlorn hope of being able to give her some relief. It is evident that she can live but a short time in her present condition.

Local anesthesia, I believe, finds its greatest value in operations on the brain. In the first place, it takes the place of a tourniquet, compressing the vessels. It is also very easy to induce anesthesia of the scalp, neck, and head. The scalp is not very sensitive to pain. The bone is hardly sensitive and the brain has no sensation at all. The scalp has been infiltrated and we will make a coronal incision and a subtentorial opening (Fig. 27). It is curious that today we use almost the same instruments in a craniotomy as were used centuries ago.

Remarks by Dr. Bochroch, Neurologist.—This patient presents an exceptional history. She was in another large hospital in Phila-

delphia and complained of headaches, exhaustion, and weakness, and a diagnosis of a diabetic condition was made. She was then brought to this hospital, where a gastric complication was noticed. She had albumin in her urine and some casts, but not sufficient to justify the steady stuporous condition which remained most of the time. In my examination I noticed one

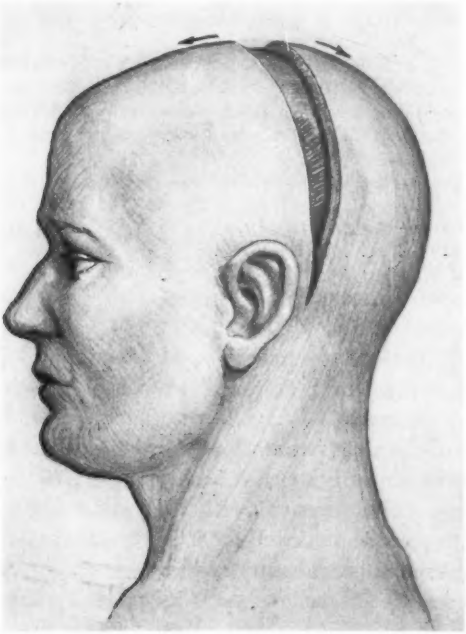

Fig. 27.—Coronal incision for operations upon the skull. Incision is hardly longer than that used in the formation of a large omega flap, but gives access to any portion of the skull.

or two patches of optic atrophy. These did not progress. Nevertheless her stuporous condition materially increased and her kidney condition did not increase. Her blood urea was not high. Superimposed on this she had conjunctivitis, weakness on the left side of her face and left leg, with a progressive paralysis and weakness of the left side of the body. She had some twitch-

ings on the right side of her face also, so that we did not know whether it was a general condition or not. The paralysis on the left side increased, and with this the optic atrophy and facetiousness, which at times made her quite witty even in her stuporous condition, which could not be explained even by the fact that she was Irish. This, as you know, was suggestive of tumor in the prefrontal region. Under these circumstances we went over the case very thoroughly, coming to the conclusion that we had better give her the benefit of the doubt, and open the skull on the right side, doing at least a decompression.

It was most unusual that this tumor at the beginning was prefrontal, and that it has since pushed itself backward into the parietal region of the brain. The *x*-ray pictures have all been negative. She has had distinct projectile vomiting on a number of occasions.

DR. BABCOCK: There is little cerebrospinal fluid. The brain is not under tension, and there is no bulging. In the absence of clear evidence of tumor we shall stop with a decompression.

QUESTION: Do you think it is a cyst?

DR. BABCOCK: No. The brain on palpation seems of normal consistency. Uremia may give the clinical picture of hemiplegia or brain tumor.

The coronal incision enables one to expose both sides of the head. Later I will show you a child, blind from a brain tumor, and with much paralysis. She has improved a great deal after a decompression; but the Hartley incision, so often pictured in text-books, was used. This incision catches the upper branches of the facial nerve, so that the child cannot raise the eyebrow on the right side of the face. The coronal incision is not a dangerous one. There is a splendid exposure, which is an advantage especially in traumatic cases, when you are not quite sure where the fracture will start or end. If you will measure a flap incision you will find that it is often the distance from mastoid to mastoid.

PUCKERED ADHERENT ULCER OF DUODENUM

J. W. White male, aged fifty-seven; married; artist.

Chief Complaint.—Severe pain in epigastrium, eructation of burning gas, inability to take solid food. Basilar headaches, nausea, and emesis. Weakness and fainting attacks.

Present Illness.—Onset two months ago, with very severe pains in epigastrium. Severe eructations of very vile and burning gas. Past five weeks has taken only liquids. On least provocation patient is nauseated and vomits. Severe basilar headaches for past two weeks. Fainted on street this week and afterward vomited food eaten eight hours previously.

Past History.—For past twenty years has had attacks of pain coming on three to four hours after taking food, and relieved by taking of food or soda. Attacks would last from few weeks to few months, and then patient would be free for a number of months. This has continued until present onset.

Physical Examination.—Extremely emaciated. Muscular atrophy. Some plus tension and muscle guard over epigastrium.

Anesthesia.—Stovain, 5 cgm., in twelfth dorsal interspace. Morphin, gr. 1/6, by hypodermic. Local novocain, 120 c.c., with adrenalin to correct fall in blood-pressure.

Operation.—10 cm. vertical upper right midrectus incision. Puckered adherent ulcer 3 cm. in diameter on anterior face of first portion of duodenum.

Spleen and kidneys negative. Gall-bladder small, blue, thin walled, empties on pressure. Transverse colon ptosed to pelvis. Appendix negative.

Posterior gastro-enterostomy with short loop, with triple row of sutures, all of No. 0 chromic catgut.

This patient is weak, starved, emaciated, and has a low blood-pressure. A little fluid put into the tissues during operation will be of help. Notwithstanding the fact that we shall depend largely on the spinal anesthesia during the operation, we shall give him a free local infiltration with 1 per cent. novocain containing adrenalin in the proportion of 1 : 75,000. We are using 5 cm. of stovain, which corresponds to about 12 cm. of novocain, the stovain being about twice as strong as novocain, just as cocain is nearly twice as strong as stovain. We do not care to have the effect go above the lower six thoracic roots. The head is lowered instantly, and the feet elevated, so that the light anesthetic solution will pass toward the sacrum. The nerve roots adjacent to the point of injection usually show the most intense effect.

In the preoperative preparation the patient's stomach was washed out, and dilute hydrochloric acid given as a gastric antiseptic.

QUESTION: What are the contraindications for spinal anesthesia?

DR. BABCOCK: Hypertension, exhaustion, moribundity—any condition that makes you fear the patient may die on the operating table, no matter what you do to him. I would suggest that if you try spinal anesthesia, you first use it only on robust young persons, instead of on old and fat or debilitated patients, with weakened hearts, who may not be able to withstand the fall in blood-pressure.

QUESTION: What was this patient's blood-pressure?

DR. BABCOCK: Before the injection, 102/74, falling in ten minutes so low that it could not be recorded; 40/? fifteen minutes after injection; 100/66 twenty-five minutes after injection.

I think the secret of making local anesthesia efficient in abdominal work is to make a small opening in the peritoneum, to introduce the finger as a guide, and to inject 100 to 250 c.c. of the solution in the preperitoneal tissue around the wound.

These blood-pressures splendidly illustrate the value of a free infiltration with an adrenalized solution of novocain in combating the hypotension of spinal anesthesia. The hypotension came first, and it took a little time for sufficient adrenalin to be absorbed from the tissues to raise the systolic pressure to 40. Yet Miss Krause has not been alarmed by the patient's condition, and an intravenous injection has not been necessary.

QUESTION: What percentage of solution do you use in your local anesthesia?

DR. BABCOCK: As a rule, 1 per cent. of procain in physiologic saline solution. After giving 200 to 300 c.c., we usually reduce the percentage to $\frac{1}{2}$, and we try to avoid injecting more than 28 minims of a 1 : 1000 solution of adrenalin.

QUESTION: What hypodermic did you give him?

DR. BABCOCK: Morphin, $\frac{1}{6}$ grain, as a cerebral sedative, something we would absolutely avoid if we considered the patient's condition alarming. It is very impressive in this case that the loss in blood-pressure is largely due to nervous shock in a wide-awake patient.

QUESTION: What is his blood-pressure now?

DR. BABCOCK: About 40.

We make a vertical incision in the upper right midrectus 10 cm. long. The patient has a large fixed puckered ulcer, very easy to demonstrate. The pyloric vein is above it. It is on the duodenal side. There is much thickening, and the pylorus is firmly bound down. I think in this case we will do a gastro-enterostomy. There is no gastric ulcer and no evidence of malignancy. A partial gastrectomy would be difficult, and, although efficient, would involve an extra hazard; so, for safety, I believe it will be better to perform the milder operation. Before we go ahead we must see if there are any other conditions that need attention. The spleen is very small, the kidneys smooth and of normal size. The gall-bladder is soft, partially collapsed, a little large, but with thin walls. We will sew the edges of the opening in the mesocolon to the stomach base to prevent the occurrence of an internal hernia. The stoma will be large, low, and toward the antrum. The jejunal loop will be sufficiently long to give the stomach a normal range of movement without traction or kinking.

When we gave this patient the spinal injection he was nervous and apprehensive, so it seemed best to give him a little morphin.

The opening in the duodenum will be absolutely straight and directly opposite the mesentery. The jejunum will not bear twisting. A longitudinal twist will cause obstruction. I had one experience from curving a suture line years ago, and I have not forgotten it. It resulted in regurgitation and vomiting, and final extirpation. I am using No. 00 catgut.

The patient's systolic pressure is now 60.

In the presence of cancer or hypo-acidity we inject a 1 : 200 solution of hydrochloric acid into the stomach through a fine hypodermic needle as an antiseptic to reduce wound infection. If the acid values are high, skin infections from operations on the stomach are unusual. Infection of the skin wound after operations for carcinoma of the stomach are common. We feel that the use of the acid has improved our results.

QUESTION: What is the blood-pressure now?

DR. BABCOCK: It has gone up to 110.

One thing about which you must be cautious is the use of adrenalin in a patient with thyroid disease. Last year we had a patient who had an extensive resection of the stomach for gastric ulcer. The blood-pressure under local anesthesia went up to 210 and stayed there. The next day the pressure was still high, the pulse bounding and 140. That night the pulse was 160 and the patient was delirious, with a temperature of 103° or 104° F. His condition was very serious. It was not until then that we realized we were dealing with an acute thyrotoxicosis from the action of adrenalin on an old and apparently symptomless adenoma of the thyroid. This was refrigerated at once and the patient recovered.

I am very much interested in resection of the stomach for ulcer. In going over our statistics a year ago I found that in a series of about 30 cases we had had only 1 death following resection. This made me feel that this operation was not as dangerous as I had thought, and we began to use it more frequently for the more complicated forms of ulcer. However, it is a much more difficult and hazardous operation than gastroenterostomy.

We have made the closure without clamps, and with the mucous edges everted, so that we may detect any bleeding. We make sure that the mucous edges are perfectly dry, and we will sponge them with dilute hydrochloric acid before putting in a second and third row of sutures.

QUESTION: What strength hydrochloric acid do you use?

DR. BABCOCK: 1 : 200, or 1 : 300. We use the acid in the rectum also when operating for fistula, and we find that from the 1 : 200 solution the mucosa becomes dry and rather white. The anastomosis is now complete, and as the stomach slips back there is no traction, twist, or angulation.

With the spinal anesthesia the patient was quiet and no clamps were necessary. This patient is quite weak and starved. Finding there is no malignant change, and that the condition is purely in the duodenum, I hold my hand about doing a radical

operation. Although the radical operation is very efficient, I cannot but believe that in this case it would have increased the danger to the patient, especially as the adhesions ran down so far on the duodenum. Under the conditions I would rather have him come back later if necessary for a marginal ulcer or other complication, if any develops. The cecum is low, almost to the pelvis. The appendix has a good lumen and is not adherent. As it seems to be causing no particular trouble, we will not prolong the operation.

QUESTION: What is the blood-pressure now?

DR. BABCOCK: About 92/66.

Postoperative Course.—Satisfactory. Transient trouble from hemorrhoids. Primary union. Patient out of bed on the eleventh day and discharged on the fourteenth day. Gastric symptoms relieved.

During the clinics spinal anesthesia was also used for chemical hysterectomy, suprapubic prostatectomy, fistula in ano with laceration of the cervix, fistula of the gall-bladder, bilateral ovarian carcinoma, chronic appendicitis with papillomatous cholecystitis, and chronic appendicitis with adhesions and uterine fibroids. There were no operative or postoperative complications.

CLINIC OF DR. JOHN G. CLARK

GYNECOLOGIC DEPARTMENT, UNIVERSITY OF PENNSYLVANIA

MYOMA UTERI

CLINICAL MANIFESTATIONS

DR. F. E. KEENE

IN the case shown this morning the history is as follows: Female, age forty-seven, unmarried, with a very marked anemia, probably of the pernicious type (although this was not definitely decided by the medical service), with a hemoglobin of 35 to 40 per cent., with red blood-cells of 2,670,000 and normal white blood-cell count. The important features in this case are: first, anemia; second, menorrhagia; third, the absence of pain; fourth, the absence of inflammatory symptoms. Of these four, the second is the outstanding symptom.

In this case the questions we ask the students are:

First, What would you say were the most common causes of vaginal bleeding in a woman of forty-seven?

They are three: first, carcinoma of the cervix; second, myoma; third, myopathic hemorrhage.

This patient has a small myoma.

Second, What are the various types of myoma?

They are: first, intramural; second, submucous; third, subserous; fourth, intraligamentous; fifth, pedunculated (subserous or submucous).

All myomata start as interstitial tumors. As they grow they assume various positions, and this difference in position has an effect on the clinical symptomatology. In the subserous type the growth is toward the periphery; in the submucous type it is toward the uterine cavity.

CASE OF SMALL UNCOMPLICATED MYOMA PRODUCING BLEEDING

(D. and C. and Radium Irradiation, 1200 mgh.)

DR. CHARLES C. NORRIS

The case to be shown this morning is an ideal one for irradiation. Dr. Keene will later take up the question of the contraindications, and in this connection one of the points we desire to emphasize is the necessity for accuracy in diagnosis. There are about twelve contraindications which have been formulated in this clinic and to which we adhere.

In addition to the history of the case, we make a thorough examination of the patient not only before but after the anesthesia is given. As a general rule gas is employed, but in case of doubt ether is used on account of the greater relaxation produced by this anesthetic. In this case the outlet and perineum are in good condition; the uterus is not larger than a three-month pregnancy. It is a little irregular in outline, particularly on the right side. It is freely movable and both ovaries are palpable and normal. In addition to the usual cleansing, and as an additional safeguard against infection, a little iodin is applied to the cervical canal before performing any intra-uterine manipulation. A thorough curettage is a preliminary to all intra-uterine irradiation in order to exclude the possibility of fundal carcinoma being present.

Fifty mgs. of radium properly screened is enclosed in a rubber tube which is cut 1 inch longer than the depth of the uterine cavity. The radium is placed in the fundus of the uterus and the lower portion of the tube stitched with a temporary suture to the cervix. The method we employ is that devised by Furness, of New York, and has been found to be satisfactory. It is, as you see, a relatively simple procedure and will check bleeding with certainty in nearly all cases. Ninety-six per cent. of our cases of benign hemorrhage so treated have been permanently cured. Twelve hundred mgh. is the standard dose employed in this clinic for benign hemorrhage in patients forty years of age or over. It is important to avoid postoperative distention of the bladder, and for this reason six-hour catheteri-

zations, provided the patient cannot void, are the routine. The mortality is practically nil and convalescence is rapid. The patients usually remain in the hospital for five days. Some nausea is often present while the radium is in place. This is rarely severe and nearly always disappears as soon as the radium is removed. Occasionally there is a little leukorrhea for a few weeks following irradiation. This has not been a prominent or frequent symptom in our patients. In view of the contra-indications to radium it can be readily understood why we stress the fact that this treatment should be employed only by those thoroughly competent to perform pelvic examinations.

IRRADIATION

DR. F. E. KEENE

The use of irradiation is often indicated in the treatment of benign uterine hemorrhage. We have been using it in this clinic since 1912; at that time irradiation in this country was more or less of an unknown field, and it was necessary for all of us who were interested in the work to feel our way very carefully. It is our belief that the more one uses radium or *x*-ray, the more one realizes its potentialities of danger. We feel that much of the criticism against radium and *x*-ray is based upon an inaccurate knowledge of what they are supposed to accomplish. Therefore we believe that the successful use of radium is dependent on accurate diagnosis. In this clinic we have not often made use of *x*-ray therapy in the treatment of benign uterine hemorrhage, its use being limited to the exceptional cases in which anesthesia is not permissible. An anesthetic is given in all cases; a careful pelvic examination is made and a thorough curettage precedes the introduction of the radium. The curettings are submitted to the laboratory for microscopic examination.

In our opinion the ideal case for use of irradiation is as follows:

I. Age. The woman who has reached the fifth decade of life and is suffering from menorrhagia.

II. Symptoms. That type of bleeding for which there is no gross demonstrable pathology present; often designated "myo-

pathic hemorrhage." In this group falls a lesion described by Cullen and Novak as hyperplasia of the endometrium; it takes place both at the beginning and end of the menstrual life, but particularly during the fifth decade.

In the fifth decade of life such cases are ideal for radium, and we have found from our studies that one full application has been sufficient in 95 to 98 per cent. of the cases treated. In the presence of myoma we insist that the tumor be not larger than that of a three-month pregnancy. We are aware that in other clinics larger tumors than this are treated by radium, but our experience has shown that larger tumors should be operated rather than irradiated.

Again, the ideal case must show an absence of adnexal pathology and hemorrhage must be the only symptom.

Therefore, the ideal case is a woman in the fifth decade of life, with myopathic hemorrhage or a myoma not larger than a three-month pregnancy, in which no adnexal complications are present and in which the only symptom is abnormal menstruation.

We have followed the theory that it is always better to underirradiate than to overirradiate, because one can always repeat the dose if necessary.

In large tumors operation is preferable, and the ideal procedure is myomectomy or hysterectomy, with conservation of one or both ovaries. In doing hysterectomy we advise a high amputation of the uterus in the hope of saving a small amount of menstrual function by leaving a ribbon of endometrium above, because studies have shown that the patient with even a scanty menstrual flow is better off symptomatically than the patient with none.

We believe that the various reports on irradiation appearing in the literature do not stress sufficiently the importance of the contraindications to its use. It has been said that the successful use of radium is dependent on knowing when not to use it, and I believe that this is undoubtedly true.

We have summarized the contraindications as follows:

(1) Large tumors; surgery is better for tumors which are larger than a three-month pregnancy.

(2) Rapidly growing tumors; this type of case suggests some active process going on within the tumor mass, either a benign process, such as extensive necrosis or hemorrhage; or a malignant process, such as sarcomatous degeneration.

(3) Symptoms other than abnormal menstruation. This applies particularly to pressure symptoms. While it is undoubtedly true that diminution in the size of the tumor commonly follows upon irradiation, nevertheless such process is a slow one, often requiring months or longer for its accomplishment. The symptoms for which the patient presents herself require more or less immediate relief, and under such circumstances, therefore, operation is the advisable procedure.

(4) Pelvic pain. Pain in association with a myoma is most commonly due to one of three lesions: the first, and most common, an associated adnexitis. It has been our experience that irradiation may cause an exacerbation of such an old infection. Second, degeneration within the tumor; it is self-evident that the effect of radium on such a condition might result disastrously. Third, adenomyomata; it is our impression that adenomyomata may not react happily to irradiation, although we may be in error in this belief. It is an invariable rule in this clinic that when pain is the prominent symptom in association with myoma, operation is the treatment of choice; and almost invariably on following out this dictum the pathology revealed at operation justified the wisdom of such a procedure.

(5) Pedunculated tumors. It is self-evident why irradiation should not be used here, as it may readily cause necrosis.

(6) Demonstrable adnexal growth.

(7) When the bleeding from the tumor is not sufficient to explain the marked secondary anemia. We have had 4 or 5 such cases in which the tumor was of considerable size, but not large enough to be a contraindication to irradiation, and where, although the hemorrhage was not unduly profuse, the patient was markedly anemic. At operation upon these patients we found an extensive degeneration of the tumor and rapid recovery, with restoration of the blood-picture to normal following operation, warranting the conclusion that such a tumor acted as a

focus of toxemia and was thus responsible for the secondary anemia.

(8) Young women. Radium in sufficient dosage to bring about a disappearance of the tumor would, in all likelihood, lead to all the annoying symptoms of a premature menopause, and would also be most likely to render the individual sterile.

(9) Distortion of the uterine cavity. Occasionally one finds that such distortion of the uterine cavity is produced by a myoma projecting into it and that introduction of radium to the fundus is impossible. We insist that the radium capsule must lie well above the internal os; otherwise the fibrosis and contraction ensuing upon the irradiation may lead to partial or complete stenosis of the canal, with the formation of hemato- or pyometra.

(10) Uncertain diagnosis. If, after a careful examination under anesthesia, we are unable to determine with certainty whether we are dealing with a myoma or an adnexal mass, we immediately resort to operation.

(11) Nervous women. It is impossible to prophesy with what ease or difficulty a woman will pass through her menopausal years. It has been our observation, however, that the menopausal symptoms are usually more exaggerated in the highly nervous individual, and it seems logical to assume, therefore, that in such a type the premature menopause brought on by irradiation may be followed by most annoying manifestations. Under these circumstances we believe that a supravaginal hysterectomy with conservation of the ovarian function is preferable to irradiation.

III. Radiophobia. It occasionally happens that the patient has, for one reason or another, been misinformed regarding the effects of radium, the consequence being that she is in mortal terror of its use. Under such circumstances, if an explanation fails to allay these fears, we believe that the wiser course is not to insist upon its use, but rather to resort to operation.

These contraindications which have just been enumerated have been formulated as the result of our experience, based upon careful observation of the after-results with patients who have

passed through our clinic. Almost without exception they are carefully followed. It is evident, therefore, that under such limitations many cases fall without the realm of irradiation into that of surgery.

In 1923, for example, 210 cases of benign hemorrhage were admitted to the clinic for treatment. Of these, 100 were operated upon and 110 were irradiated. Our belief is that the advent of radium marks an epoch in gynecologic therapy. Irradiation is to be looked upon in no way as a competitor of surgery; the indications for the use of one are just as definite as the indications for the use of the other, and we feel that the surgeon who is not in a position to give his patients the benefit of one or the other method of treatment is not doing justice by them.

PATHOLOGY

An attempt is made to correlate the pathologic study with the symptomatology in each case. It is unnecessary to review with you the question of histology of myomata. It is the commonest form of pelvic tumor. Hyperplasia of the endometrium is a common accompaniment of myomata or may occur independently. It is amenable to irradiation. Myomata are relatively avascular tumors, and as they develop they tend to undergo various forms of degeneration, the most frequent of which is the hyaline form, edema and cystic degeneration being next in order.

The question of sarcomatous degeneration is an important one, particularly in relation to treatment by radium. Hysteromyomectomy is accompanied by about 2 or 3 per cent. mortality and is one of the most satisfactory operations which the gynecologist is called upon to perform. Were sarcomatous degeneration of myomata frequent, it is apparent that irradiation would be unjustifiable. A careful histologic study has been made of all myomata removed in this clinic, now comprising some 1500 specimens. This has shown 0.39 per cent. of our myomata the seat of sarcomatous degeneration. In not a single case treated by radium has sarcoma subsequently developed as far as we have been able to determine. A careful follow-up of all cases is main-

tained. In view of the fact that myomata cease to grow after the ovarian stimulus is checked, it is a common thing to have students ask us when a case is forty-five or fifty years of age why it would not be advisable to wait until the menopause rather than submit the patient to treatment. The answer is that the menopause is greatly delayed in these women, often not occurring until fifty-two or fifty-five years of age or even later. For this reason delay is inadvisable. The question of how irradiation produced its results in cases of benign hemorrhage is still open to discussion.

Three theories have been advanced: the first, that radium produces an internal castration by destruction of the follicle-bearing portions of the ovary. In view of the fact that 1200 mgh. of radium introduced within the uterus produced all the nervous phenomena which accompanies the surgical menopause, this would seem to be a satisfactory explanation. Menopausal symptoms develop with about the same frequency and severity as they do following supravaginal hysterectomy. Furthermore, laboratory studies upon animals and upon human ovaries which have been submitted to this form of treatment confirm this theory.

The second theory is that irradiation produces an endarthritis in the vessels of the tumor and in the myometrium. This doubtless is a contributing factor, and the third theory is that scar tissue is produced within the uterus and especially in the endometrium. The latter we believe to be more theoretic than actual, and a demonstration of the scar tissue in a previously irradiated uterus has in our hands never been conclusive. One advantage of irradiation is that even should the treatment fail, subsequent operation is not precluded. Properly performed irradiation either by means of radium or the *x*-ray produced generally similar results. The advantages of radium are that one application suffices. Furthermore, it is essential that fundal carcinoma be excluded prior to submitting any case to irradiation. To secure this end it is necessary to perform a diagnostic curettage, and irradiation at the time of the curettage is a simple procedure.

SUMMARY OF RESULTS

DR. FRANK B. BLOCK

This summary embraces a three-year period from 1922 to 1924 inclusive, and covers 436 cases of myoma uteri which were admitted to this department. We have excluded one case of ovarian carcinoma complicated by a fibroid uterus which died after only an exploratory laparotomy.

TABLE 1

METHODS OF TREATMENT

	1922.	1923.	1924.	Total.
Total number applying for treatment	135	131	170	436
Treatment refused or delayed	6	2	6	14
Number treated	129	129	164	422
Number of operations	75	77	115	267
Percentage of operations	58.1	59.7	70.1	63.2
Number of radium irradiations	54	51	48	153
Number of Roentgen irradiations	0	1	1	2
Total number of irradiations	54	52	49	155
Percentage of irradiations	41.9	40.3	29.9	36.8

Table 1 shows that of 436 cases, in 14 operation was refused or delayed on account of some constitutional contraindication. Of the remaining 422 cases, 267 (63 per cent.) were subjected to operation and 155 (36 per cent.) to irradiation, so that you can see that we are operating upon nearly twice as many cases as we are irradiating. Of these irradiations in 2 cases the Roentgen ray was used. All of the others were subjected to radium rays. An analysis of these cases by separate years shows some rather interesting facts. In the first place we find that our tendency has been toward operation rather than irradiations, as evidenced by the fact that in 1922 58.1 per cent. of the cases were operated upon; in 1923, 59.7 per cent., and in 1924, 70.1 per cent. In dealing with a statistical study of this sort it is often difficult to determine which cases to include, as many cases of uterine fibroids are complicated by some other lesion (in this series 37.4 per cent.), in many of which the associated condition is more important and really constitutes the cause of the illness. In order to avoid criticism in the method of case

selection we have included every case in which a fibroid uterus was present, no matter how little it had to do with the symptomatology.

TABLE 2

COMPLICATING PELVIC LESIONS OF CASES OPERATED UPON

	1922.	1923.	1924.	Total.
None	40	46	69	155
Marked intraligamentary	5	3	6	14
Ovarian cyst	8	9	13	30
Pelvic inflammatory disease	21	10	22	53
Carcinoma of fundus	0	2	2	4
Carcinoma of ovary	1	2	1	4
Pregnancy	0	3	1	4
Carcinoma of cervix	0	1	0	1
Sarcoma of uterus	0	1	0	1
Stricture of sigmoid	0	0	1	1
Total	75	77	115	267
Percentages of totals which were uncomplicated by other disease	53.3	63.6	65.2	63.3

Among the associated pelvic pathologic conditions pelvic inflammatory disease holds first place as a complicating factor, and ovarian cysts are in an important second place, as seen by Table 2.

TABLE 3

TYPES OF OPERATIONS IN THE UNCOMPLICATED CASES

	Vaginal myomectomy.	Abdominal myomectomy.	Supravaginal hysterectomy, bilateral oöphorectomy.	Supravaginal hysterectomy, unilateral oöphorectomy.	Supravaginal hysterectomy, ovaries retained.	Panhysterectomy, bilateral oöphorectomy.	Panhysterectomy, unilateral oöphorectomy.	Panhysterectomy, both ovaries retained.	Vaginal hysterectomy.	Total.
Number in 1922	1	5	8	10	17	2	1	1	0	45
Percentage for year	2	11	17	22	37	4	2	2		
Number in 1923	0	2	11	16	15	2	1	2	0	49
Percentage for year	0	4	22	32	30	4	2	4		
Number in 1924	4	12	9	10	30	3	1	4	2	75
Percentage for year	5	16	12	13	40	4	1	5	2	
Total number for three years	5	19	28	36	62	7	3	7	2	169
Percentage	2.9	11.2	16.5	21.3	36.5	4.1	1.7	4.1	1.1	

An analysis of the types of operation performed has been made in each of the three years, and has shown that our tendency has been to do more myomectomies, thus preserving the uterus, and fewer total ovarian ablations. The ovaries are usually conserved if healthy unless the patient is well past the menopause. In this series (Table 3) in only 20.6 per cent. of cases were both ovaries sacrificed, nearly one-half of these being in cases of associated pelvic inflammatory disease. If lutein tissue is present in the ovary, we preserve it irrespective of the patient's age, as this signifies that the ovary is still functioning.

Supravaginal hysterectomy with conservation of both ovaries is our operation of choice, having been done in 36.5 per cent. of the cases, or almost twice as frequently as supravaginal hysterectomy with bilateral oöphorectomy. In this connection I might mention that we are thoroughly aware of the statement made by many surgeons that the operation of total removal of the uterus is preferable to supravaginal hysterectomy because of the possibility of the later occurrence of carcinoma in the retained stump; but in our experience such possibility has been greatly overestimated and does not justify the total operation, because we feel that the total operation is always a more dangerous one, certainly in our hands and in the hands of most everyone else.

TABLE 4

POSTOPERATIVE COMPLICATIONS

	1922.	1923.	1924.	Total.	Percentage of series.
Number of operations	75	77	115	267	
Wound infection	2	7	5	14	5.2
Pelvic peritonitis	4	2	4	10	3.7
General peritonitis	1	0	1	2	0.7
Pulmonary embolism	1	1	3	5	1.8
Postoperative pneumonia	1	1	1	3	1.1
Phlebitis	0	2	0	2	0.7
Death	2	0	1	3	1.1

In regard to morbidity and mortality it was found (Table 4) that wound infection was the commonest complication (5.2 per cent.), with pelvic peritonitis (3.7 per cent.), pulmonary embolism (1.8 per cent.), postoperative pneumonia (1.1 per cent.)

phlebitis (0.7 per cent.), and general peritonitis (0.7 per cent.) in the order of frequency.

TABLE 5

MORTALITY

	Number.	Deaths.	Percentage mortality.
Uncomplicated operations	169	0	0
Irradiations	155	0	0
Total of uncomplicated cases	324	0	0
Complicated cases	98	3	3
Grand total	422	3	0.7
Excluding ruptured suppurating ovarian cyst	..	..	0.47

Speaking of mortality, we find that if we consider only the uncomplicated myomata, there were no deaths in any of the 169 operative and 155 irradiated cases. In other words, 324 uncomplicated myomata have been treated by appropriate measures without a death. On the other hand, in the series of 98 cases of fibroid associated with other pelvic pathology there were 3 deaths, or a mortality of 3 per cent., so that the mortality in the treatment of fibroid in our hands has been entirely due to complicating disease.

Taking all operated cases, even including the exploratory laparotomy previously mentioned, the mortality of the operative group was 1.4 per cent. Excluding this exploratory laparotomy, the mortality is 1.1 per cent. One of the deaths was in the case of a ruptured suppurating ovarian cyst occurring in an emergency case in which the associated fibroid tumor was a secondary consideration. It was included for the sake of completeness, although not properly belonging in a series of fibroid. If this case was excluded, the mortality in the operated series of 266 cases was 0.7 per cent., or two deaths, one from postoperative pneumonia and one from general peritonitis. If we apply these two deaths against the entire series of 422 cases treated either by operation or radium, we find the mortality drops to 0.47 per cent., which properly represents our mortality in the treatment of uterine fibroid. However, if we include the ruptured suppurative ovarian cyst, as shown in Table 5, the mortality is 0.7 per cent. for the entire series.

TABLE 6

ANALYSIS OF IRRADIATION CASES

	1922.	1923.	1924.	Total.
Total number	54	51	48	153
Under thirty years	1	1	0	2
Thirty-one to thirty-five years	1	1	2	4
Thirty-six to forty years	5	5	8	18
Over forty-one years	47	44	38	129
Percentage over forty-one	87	86	79	84.3
Menorrhagia	49	44	42	135
Metrorrhagia	11	10	7	28
Leukorrhea	10	9	4	23
Backache	15	9	8	32
Pressure symptoms	1	0	0	1
Radium only	35	31	32	98
Radium and plastic	17	16	12	45
Radium and vaginal myomectomy	2	4	2	8
Radium and abdominal operation	0	0	2	2
Menses stopped	28	32	13	73
Menses continued	9	7	3	19
Required re-irradiation	1	1	1	3
Required hysterectomy	3	3	0	6

Table 6 shows our analysis of the 153 cases in which radium was applied, and simply confirms what has already been told you this morning. In this series 84.3 per cent. of patients were over forty-one years of age; menorrhagia was by far the most important symptom, with backache, metrorrhagia, and leukorrhea much less frequently present. In only one case were pressure symptoms present. Of 153 cases, in 98 radium only

TABLE 7

RESULTS OF IRRADIATION

	1922.	1923.	1924.	Total.
Total number	54	51	48	153
Number traced	37	39	16*	92
Cured	32	35	15	82
Percentage cured	86	89	93	89.1
Improved	1	1	0	2
Re-irradiation percentage	..	..	..	3.2
Hysterectomy percentage	..	..	..	6.5

* Many cases in this series too recent for follow-up.

was applied; in 45 some plastic operation on the cervix or perineum was performed in addition to the radium application; in 8 other cases vaginal myomectomy was performed before the radium was inserted; while in 2 other cases there was an abdominal operation coincident with the radium application.

Of the 92 cases (60.1 per cent.) traced, the menses stopped in 73 and continued in 19; 82 patients were cured (89.1 per cent.); 2 were improved, but not entirely relieved; 6 patients (6.5 per cent.) required subsequent hysterectomy; and 3 patients (3.2 per cent.) required a second irradiation. The mortality in the series was nil. Two cases were subjected to *x*-ray therapy exclusively. One of these has been traced and has a satisfactory result. We seldom use the *x*-ray unless there is a definite contraindication to both operation and radium irradiation.

TABLE 8

COMPARATIVE ANALYSIS OF OPERATION AND IRRADIATION

	Operation.	Irradiation.
Total number	267	153
Number traced	150	92
Percentage traced	56.1	60.1
Number cured	142	82
Percentage cured	94.7	89.1
Mortality percentage	1.1	None

Table 8 shows a comparison of the two series of cases.

As a result of the study of our recent work our present views may be summarized somewhat as follows: We believe that the treatment of uterine fibromata should be undertaken only by those who are thoroughly familiar with the operative as well as the irradiation method of treatment. The mortality of radium irradiation in properly selected cases has been nil in this series and satisfactory results will be obtained in 90 per cent. of the cases after one treatment. After we add the 3 per cent. which are cured after a second irradiation, it will be seen that the satisfactory results from operation and irradiation are almost parallel.

A CYSTOGRAM STUDY OF CYSTOCELE AND PROLAPSUS (PRELIMINARY REPORT)

DR. L. K. FERGUSON

As a resident on the service of Dr. Clark I became interested in cases of prolapsus and cystocele. It excited my curiosity to see an inverted uterine sound make a bulge by pushing out the bladder and vaginal walls under the symphysis. With an idea, then, of determining how much of a bladder deformity occurred in these cystocele and prolapsus cases a series of cystogram studies was made, the results of which form the subject of my talk.

This study, begun to satisfy a youthful curiosity, has led to several interesting observations:

1. It is probably the most impressive and convincing method of teaching the deformity of the bladder that occurs in cystocele and descensus.

2. It provides a method of precision in recording the diagnosis of cystocele or descensus.

3. It enables one to determine the degree of anatomic reposition of the bladder obtained by operation in these cases.

4. It gives a tangible means of comparing the results of the various forms of operations performed for the relief of these conditions.

5. It allows us to keep an indelible and exact record of each case which can be referred to and used as a standard for subsequent cystograms taken at intervals of a year or more. We can thus determine whether or not our operation has stood the test of time, and by comparison we can tell which of the various operations gives the most lasting results.

The technic of the examination is simple. The patient is asked to void thirty minutes before the time for her examination. She is placed on the horizontal fluoroscopic table and draped. A soft-rubber catheter is introduced, using all the ordinary aseptic precautions. The patient then is told to extend her legs, and the fluoroscopic screen is placed over her suprapubic region. After the catheter has been visualized, a 12 per cent. sterile

solution of sodium iodid is allowed to run into the bladder until the patient complains of a feeling of distention or discomfort. Usually from 250 to 300 c.c. may be introduced without any trouble (Fig. 28).

A plate is made in the prone position, then the catheter is removed and the patient is assisted to the vertical fluoroscope, where a second plate is made. An effort is then made to have the patient completely empty her bladder, when she is examined

Fig. 28.—Tray used in making cystograms: The reservoir is graduated and the flow from it is controlled by a glass cock, which is easily operated in the dark. The catheter to be used is attached by a small rubber tube and is filled with the sodium iodid solution before it is introduced into the bladder.

a third time in the vertical fluoroscope for residual urine, and, if any is found, a second vertical plate is made.

The procedure is repeated eighteen to twenty days after the operation, and, when possible, a year or more after discharge from the hospital. In some 58 examinations there have been no symptoms or signs develop after one of our examinations. Repeated examinations of the urine show no change before and after cystography, so we have come to look upon the procedure

as perfectly harmless when properly carried out and unattended by any untoward after-effects.

Case I.—Miss Mary P., aged sixty-five years, was admitted complaining of a body protruding from the vagina, and nocturia.

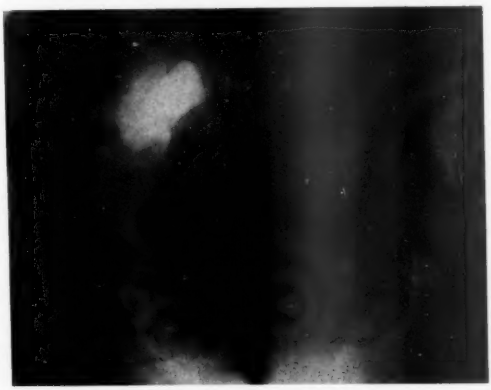

Fig. 29.—Preoperative cystogram: Prone position. Note normal position of bladder entirely above the symphysis.

Fig. 30.—Preoperative cystogram: Erect position. Note lower border of bladder in normal position at upper level of symphysis.

Her entrance diagnosis was incomplete prolapsus, but our cystogram showed the bladder to have a normal shape and to be

in a normal position (Figs. 29, 30). The protruding mass consisted of a markedly hypertrophied cervix. A vaginal hysterectomy was performed. No immediate postoperative cystograms

Fig. 31.—Postoperative cystogram fourteen hours after vaginal hysterectomy Prone position. Bladder position good.

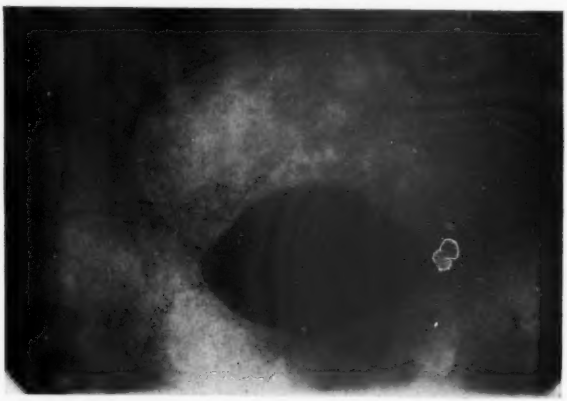

Fig. 32.—Postoperative cystogram: Erect posture. Note sagging of bladder in midline.

were taken, but fourteen months later cystogram studies were made. At that time she had no symptoms, and the pelvic support, on examination, seemed good. The erect cystogram,

however, shows a slight sagging of the anterior vaginal wall (Figs. 31, 32).

Case II.—Mrs. Charlotte T., aged fifty-eight years, had had a marked cystocele and partial prolapsus for ten years. She had dysuria, frequency, and a sense of pelvic pressure.

Fig. 33.—Preoperative cystogram: Prone position. Note bladder deformity.

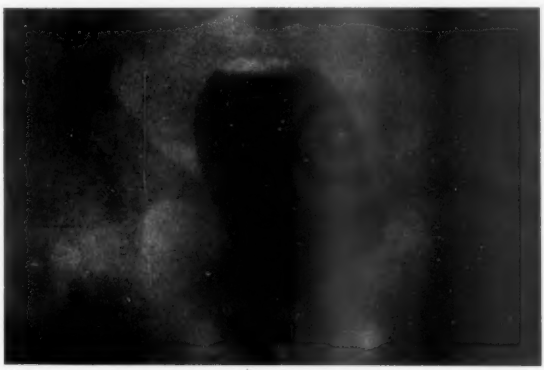

Fig. 34.—Preoperative cystogram: Erect position. Note deformity of bladder and position of shadow below symphysis.

Her cystograms (Figs. 33, 34) show what we have come to look upon as the typical appearance of the bladder in cystocele

cases; the irregular clover leaf shape of the bladder in the prone position, and the elongated bladder in the erect posture, with a broad point extending down below the level of the symphysis.

Fig. 35.—Postoperative cystogram: Prone position.

Fig. 36.—Postoperative cystogram: Erect position. Considerable improvement in bladder position after vaginal hysterectomy.

Considerable replacement of the bladder followed her operation—a vaginal hysterectomy with an anterior and posterior

colporrhaphy (Figs. 35, 36). Sixteen months after her operation she was free from symptoms and her cystogram appear-

Fig. 37.—"Follow-up" cystogram sixteen months after operation. Prone position.

Fig. 38.—"Follow-up" cystogram: Erect position. Note slight midline sag of bladder.

ance showed only a very slight sagging of the bladder (Figs. 37, 38).

Case III.—Mrs. Anna K., aged sixty-seven years. Patient was a small thin woman, who had a complete descensus since the birth of her second child thirty years previously. She had 2 children since. Eight different kinds of pessaries had been tried without success. This item of history is a common one in this type of case, as is the long duration of their trouble. They bear their burden without too much complaint until driven to seek relief,

Fig. 39.—Preoperative cystogram: Prone position. Marked bladder deformity.

as this lady was, because of imperative frequency of urination or troublesome incontinence.

Her preoperative cystograms are unique in our series (Figs. 39, 40). In the erect posture one obtains the impression that we are dealing here with just a marked cystocele, but in the lateral erect view (Fig. 41), because of the thinness of the patient and the marked anterior displacement of the uterus and bladder, we were able to obtain a picture showing the narrow extension of the bladder pulled down on top of the cervix in the prolapsus. This picture we have not been able to duplicate because most of

our pateints were too fat, and their descensus was not far enough anterior for the bladder shadow not to be superimposed on the femur shadow.

Fig. 40.—Preoperative cystogram: Erect position. Bladder shadow comes well below symphysis.

Fig. 41.—Preoperative cystogram: Erect position. Lateral view. Note bladder deformity prolonged as narrow shadow above cervix.

The postoperative cystograms (Figs. 42, 43) showed fairly good anatomic reposition of the bladder after a vaginal hysterec-

tomy, with anterior and posterior colporrhaphies. A hydro-ureter is noted, a more marked example of which will be seen

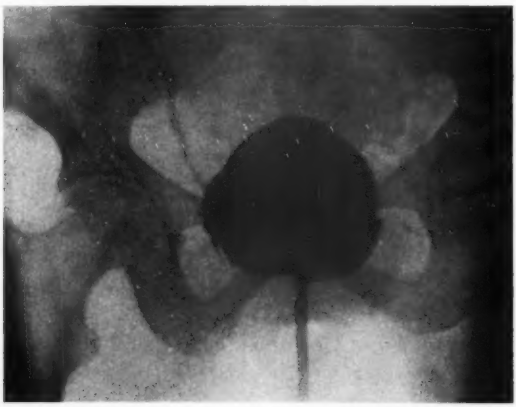

Fig. 42.—Postoperative cystogram: Prone position. Bladder position much improved after vaginal hysterectomy. Note hydro-ureter on right side.

Fig. 43.—Postoperative cystogram: Erect position. Hydro-ureter no longer present.

later. She was symptom free seventeen months after her operation, in spite of a slight drooping of the anterior vaginal wall. We have not been able to get her follow-up cystograms as yet.

Case IV.—Mrs. Mary A., aged sixty-five years. Patient had had a complete prolapsus for fifteen years. She had had pain, difficulty, and frequency of urination for some years, but more recently was developing increasing incontinence.

Fig. 44.—Preoperative cystogram: Prone position.

Fig. 45.—Preoperative cystogram: Erect position. Note large tongue-like shadow of bladder in the descensus.

This is the first of the series of larger descensus cases, and the cystograms (Figs. 44, 45) show a bladder of which the greater part seems to be within the pelvis. As you will see, those which

follow show increasing amounts of the bladder in the descensus, until the last case shows nearly the whole of the bladder outside of the pelvis.

Fig. 46.—Postoperative cystogram: Prone position. Marked improvement following interposition operation.

Fig. 47.—Postoperative cystogram: Erect position. Note convexity of dependent portion of bladder shadow, marking situation of fundus of uterus.

A Watkins interposition operation, with an anterior and posterior colporrhaphy, gave the excellent result seen in Figs. 46, 47.

It is interesting to note the convex deformity of the base of the bladder made by the fundus of the uterus in its new position.

She was free from symptoms six months after her operation. No follow-up cystogram has been made.

Case V.—Mrs. C., aged forty-five years, had had her complete prolapsus for two years only. However, besides dysuria, she

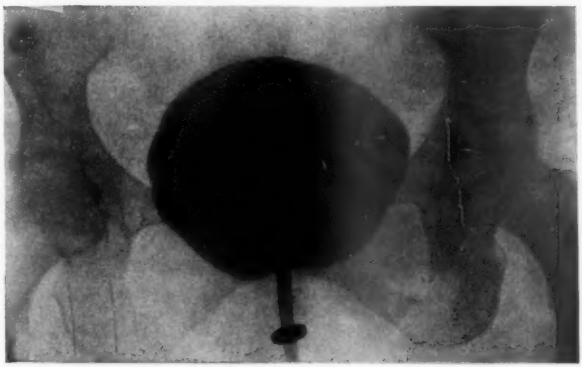

Fig. 48.—Preoperative cystogram: Prone position.

Fig. 49.—Preoperative cystogram: Erect position. Note marked bladder deformity.

developed incontinence rather early, and for this reason was driven to operation.

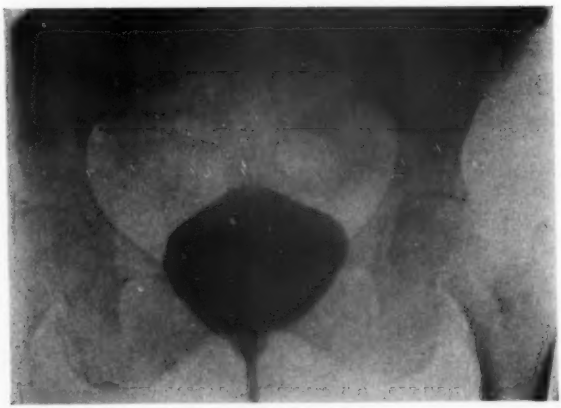

Fig. 50.—"Follow-up" cystogram: Prone position. One year after vaginal hysterectomy.

Fig. 51.—"Follow-up" cystogram: Erect position. One year after operation. Note recurrence of bladder deformity.

Her preoperative cystograms (Figs. 48, 49) are very much like those of Case IV. Unfortunately, no immediate postoperative cystograms were made. A vaginal hysterectomy and anterior

and posterior colporrhaphy was done. A year later, however, a cystogram study was made (Figs. 50, 51). Her symptoms have all disappeared except for a slight burning on urination, but her cystograms show a considerable return of her cystocele, and Fig. 52 shows the amount of residual urine after voiding.

Fig. 52.—"Follow-up" cystogram. Erect position after voiding showing amount of bladder retention.

This case illustrates the value of cystograms in checking up on the results of the operative treatment of prolapsus.

Case VI.—Mrs. Letitia T., aged sixty-nine years, had a complete descensus of two and a half years' duration. Her only symptoms were the discomfort due to the protruding mass and a slight frequency.

Her preoperative cystograms (Figs. 53, 54) show the typical dumb-bell deformity of the larger prolapsus cases.

Marked improvement is seen after a vaginal hysterectomy with an anterior and posterior colporrhaphy (Figs. 55, 56). We find that the patient was unable to void completely after operation (Fig. 57). This we believe is due to a contracted urethra. A urethral orifice made by several suburethral stitches placed purposely at operation. We have no follow-up cystogram

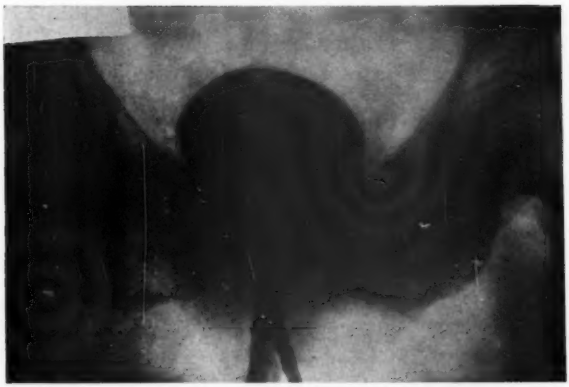

Fig. 53.—Preoperative cystogram: Prone position. The midline projection is the bladder, the shadow to the left is made by the catheter.

Fig. 54.—Preoperative cystogram: Erect position. Typical hour-glass deformity of cases with complete prolapsus.

Fig. 55.—Postoperative cystogram: Prone position.

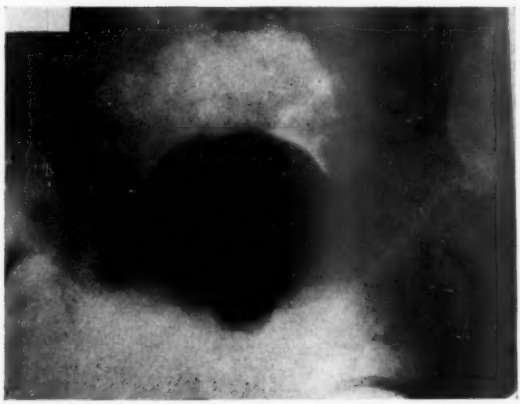

Fig. 56.—Postoperative cystogram: Erect position. Marked improvement after vaginal hysterectomy.

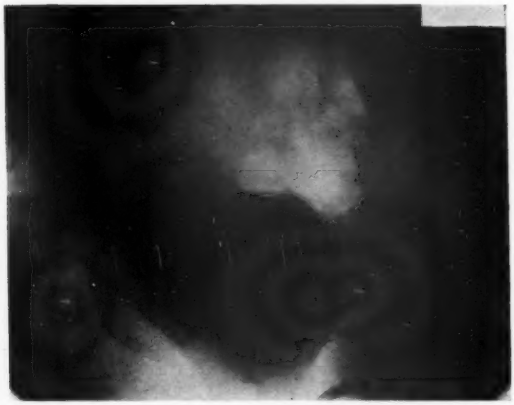

Fig. 57.—Postoperative cystogram: Erect position after voiding. Bladder retention probably due to contracted urethra.

as yet, but we hope to find complete disappearance of this symptom at our next examination.

Case VII.—Mrs. Sara W., aged sixty-five years, showed a complete descensus of thirty years' duration. She had the usual urinary symptoms and increasing incontinence when walking.

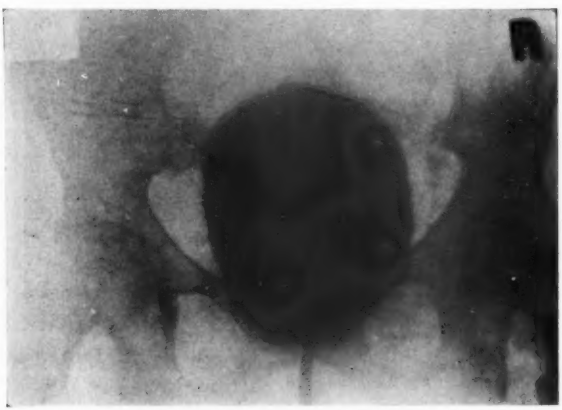

Fig. 58.—Preoperative cystogram: Prone position. Note bladder enlargement due to stretching in prolapsus.

Fig. 59.—Preoperative cystogram: Erect position. Dumb-bell deformity.

Fig. 60.—Postoperative cystogram: Prone position.

Her preoperative cystograms (Figs. 58, 59) show the dumb-bell deformity even more marked than in Case VI. She had a slight residue after voiding. In addition to her prolapsus she

had a parovarian cyst on the right side, so a combined abdominal perineal operation was performed with a suspension by the

Fig. 61.—Postoperative cystogram: Erect position. Bladder position well maintained by Olshausen operation.

Fig. 62.—"Follow-up" cystogram: Prone position one year after operation.

Olshausen method and an anterior and posterior colporrhaphy. Her postoperative cystograms (Figs. 60, 61) showed an excellent result and she voided completely.

Fig. 63.—"Follow-up" cystogram: Erect position. Note that bladder position is practically the same one year after operation.

Fifteen months later the patient was free from all symptoms and shows a result as good as immediately after operation (Figs. 62, 63).

Case VIII.—Mrs. Rebecca T., aged sixty-four years. Patient had a complete prolapsus of four years' duration, associated during the past six months with marked incontinence.

Her preoperative cystograms (Figs. 64, 65) show the degree of incontinence which she had, since she was able to retain only that amount of solution which occupied the most dependent portion of her bladder. Strangely, she was able to void completely. A Sturmdorf trachelectomy with an anterior and posterior colporrhaphy was performed. Her postoperative cystograms (Figs. 66, 67) show to a marked degree what we had already noted in Case 3, a bladder reflux, with hydroureter formation. In this case a complete pyelogram was obtained, which persisted in the erect posture, but disappeared completely after voiding.

This phenomenon suggests the mechanism of the formation of the cystocele in these cases of prolapsus. It seems probable that the uterus, losing the support of the uterosacral ligaments,

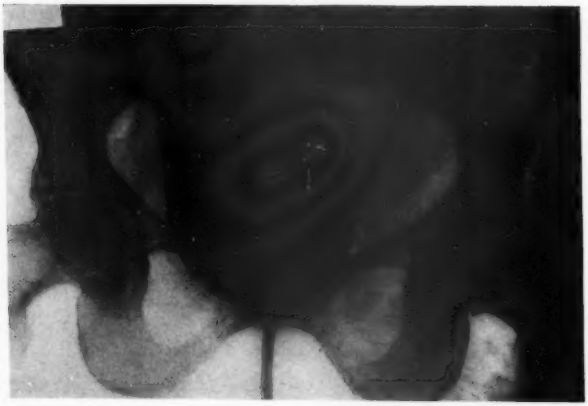

Fig. 64.—Preoperative cystogram: Prone position. Note bladder enlargement and deformity.

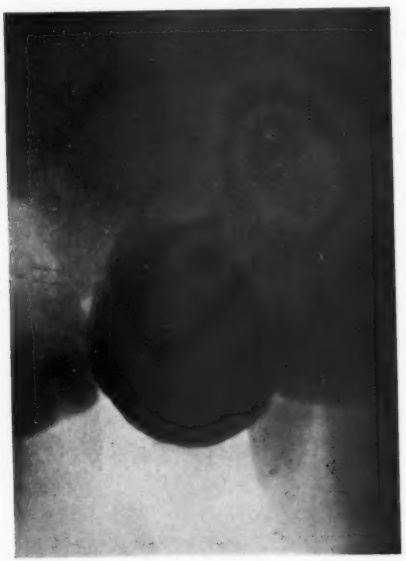

Fig. 65.—Preoperative cystogram: Erect position. Shadow is noted far below symphysis, marking the dependent portion of the prolapsus.

gradually descends down the vaginal canal. This causes a backward rotation of the bladder through the pull on the utero-vesical and cardinal ligaments. The rotation is about the

Fig. 67.—Postoperative cystogram: Erect position. Bladder position is well maintained by anterior and posterior colporrhaphy.

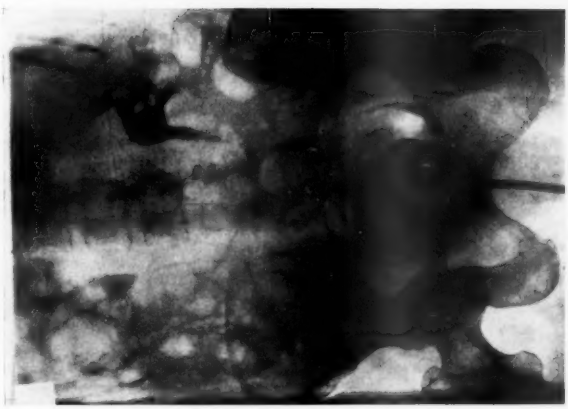

Fig. 66.—Postoperative cystogram: Prone position. Note complete pyelogram.

urethral orifice as an axis. This rotation causes a stretching of the ureters, since they enter the bladder from behind and below. When the operation approximately replaces the bladder in its normal position, the ureters and their orifices are relaxed, allow-

ing the iodid solution to flow up the ureters, and in this case even to fill the kidney pelves.

No symptoms followed this examination. No follow-up cystograms have yet been made.

Case IX.—Mrs. W., aged sixty-two, had a prolapsus for thirty-four years, with frequency and incontinence for the past three or four years. For the last year she has been unable to replace the mass, and a large ulcerated area is seen.

Fig. 68.—Preoperative cystogram: Prone position. Patient had marked bladder enlargement and deformity.

Her cystograms (Figs. 68, 69) show the most marked deformity that we have observed. In the prone position the markedly irregular bladder is well seen. When erect practically the whole bladder is seen to extend outside the body, surrounded by a halo of edematous soft tissues. She had considerable residue after voiding (Fig. 70). No postoperative cystograms have been made as yet.

It is intended to complete this study with follow-up cystograms on all cases, and as the series grows we hope to be able to make deductions as to the efficiency of the various operations in relieving these conditions permanently. Our series is too small now to warrant the forming of such opinions.

Fig. 69.—Preoperative cystogram: Erect position. Note that practically the whole bladder is outside the body.

Fig. 70.—Preoperative cystogram: Erect position after voiding. A large amount of the opaque solution is retained in the bladder.

I wish to express my thanks to Dr. John G. Clark and Dr. Henry K. Pancoast and their staffs for their aid and co-operation in this study.

CARE OF THE GYNECOLOGIC PATIENT, INCLUDING METHODS OF FOLLOW-UP

DR. ROBERT A. KIMBROUGH, JR.

The purpose of this paper is to outline for you our method of dealing with a patient from the time of her admission to the ward until she is discharged, not only from the ward but from the follow-up service.

It is practically an invariable rule that the patient be admitted to the ward fully forty-eight hours before the time of operation. On the first day a careful history is taken by the intern, and a general physical examination is made. The resident gynecologist and the intern then collaborate in a pelvic examination. A tentative diagnosis is made, and is recorded on the history sheet. An outline of any special investigations is made, and these are carried out as rapidly as possible. This includes such procedures as *x*-ray examinations, cystoscopy, study of kidney function, and blood chemistry. It is an invariable rule that all patients presenting urinary symptoms shall have a cystoscopic examination prior to operation. This rule applies not only to cases of primary urologic nature but also to those in which the urinary symptoms are more or less easily explained by extra-urinary pelvic conditions.

On the second day of hospitalization the routine studies of the blood and urine are made. During these two days of preliminary study the temperature, pulse, and respiration are observed every fourth hour. By these observations we are able to detect the possible presence of upper respiratory infection, and, in general, to form a surgical acquaintance with the patient. By the use of these precautions we are quite certain that our incidence of morbidity has been greatly diminished.

As will be seen from further description our chief aim in technic is simplicity. We try to bring the patient to the operating table in as nearly normal a condition as possible.

A mild cathartic is given thirty-six hours before operation. This is by no means intended as a strong purge, and is the only cathartic given during the preoperative care. The patient is given a regular house diet until twelve hours before operation. On the evening before operation the operative region is shaved, and no other local preparation is given until the patient is anesthetized. Four hours before the scheduled time of operation a simple enema is given. Dr. Clark feels very strongly that a thoroughly purged and empty intestinal tract is largely responsible for severe gas pains and undue tympanites. The uneventful convalescence obtained by observation of this technic stands in marked contrast to the severe gas pains and marked distention seen in practically all abdominal cases twenty years ago.

Forty-five minutes before the anesthetic is to be started the patient is given a hypodermic of $\frac{1}{4}$ grain of morphin sulphate and 1/150 grain of atropin sulphate. She is then kept in her own bed for fully thirty minutes before removal to the clinic.

The actual technic in the operating room will not be taken up in this presentation, with the exception of one detail. In order to eliminate the discomfort of proctoclysis given by the Murphy drip method, Dr. Clark, some years ago, instituted the use of large rectal infusions while the patient is still on the operating table. Before the operation is begun an ordinary rectal tube is inserted to a depth of about 4 inches, and is fixed in place by adhesive strapping. When the operation has been completed with the exception of closure of the incision, the rectal tube is connected with a tube and funnel system; 1000 c.c. of a 5 per cent. aqueous solution of sodium bicarbonate at 110° F. is slowly given by gravity into the rectum. The patient is placed in the extreme Trendelenburg posture and the solution rapidly fills the entire extent of the large intestine. The solution given in this way serves several useful purposes: First, the necessary amount of fluid is given to tide the patient over to such a time as she can take fluids by mouth. This is done without any discomfort to the patient, and we feel that it is a great improvement over the old drip method. The second advantage is the ability to discover any possible injury to the large bowel

before the abdomen is closed. Still another advantage is the application of a highly efficient intra-abdominal hot-water bottle at the time the patient is most in need of heat. Consequently, it is rarely that we see postoperative subnormal temperature, which is so common in cases where one depends solely on external application of heat. By no means a minor advantage is the ease with which the loops of a redundant sigmoid can be made to take their normal places after being filled by the solution. Also of great importance is the fact that the urinary output for the first twenty-four hours is practically doubled over that obtained by the old drip method.

While the patient has been in the operating room her bed has been moved from the main ward into one of our specially designed recovery cubicles. This recovery room is a small ward which has been subdivided into eight smaller spaces. Each cubicle is large enough to accommodate one bed and a service stand. The newly operated patient is thus isolated from the recent operative cases, and the group of patients within the first few days of convalescence is in a wholly separate ward from those further advanced in their recovery. The patient is kept in this recovery room until her convalescence is definitely established; pain is relieved by frequent hypodermics of heroin. Heroin is chosen as it has been our observation that less nausea and less tendency to ileus follows its use than in cases where morphin is employed.

As soon as recovery from the anesthetic is fairly advanced practically all our patients are placed in the Fowler or semi-Fowler posture. This applies to both abdominal and plastic cases. Unless the plastic operation has been of the most extensive type, we feel that there is no contraindication to moderate elevation of the foot and head of the bed. The position thus obtained gives the greatest muscular relaxation. Consequently, backache is much less frequently seen than when patients are compelled to lie flat for a number of days.

Catheterization is always an important matter in the postoperative care of a gynecologic patient. We greatly prefer to take the minimal risk of frequent catheterization to that of an

overdistended bladder. After an ordinary abdominal operation the patient is catheterized every twelve hours until able to void. The same rule holds for plastic cases in which no anterior colporrhaphy has been done. In cases where anterior colporrhaphy has been performed the patient is catheterized every eight hours until vesicle function has been restored. Even after the patient has begun to void she is catheterized once in each twenty-four hours until we are sure there is no residual urine.

In neither plastic nor abdominal cases is any attempt made to evacuate the bowels until seventy-two hours after the operation. During this time liquid diet is given every fourth hour. Water in small amounts is given as soon as vomiting ceases. After seventy-two hours a low enema is given. When the bowel has been satisfactorily evacuated soft diet is given for a period of forty-eight hours, after which time the regular house diet is allowed. The bowels are regulated by the administration of 1 ounce of liquid petrolatum twice daily, reinforced by the mild vegetable cathartics as necessary.

Another point of our technic which makes for simplicity is the infrequency of the postoperative dressings. The incision is closed by four tension sutures of silkworm-gut and a subcuticular stitch of catgut. Provided the temperature remains normal and in the absence of other signs of wound complications, the dressings are not disturbed until the tenth postoperative day. At that time the tension sutures are removed. In the large majority of cases this is the only dressing the patient will require until the time of discharge.

An active consultation service is maintained with the medical service of the hospital. In case such a consultation should be desired, a special form of request is filled out, and the findings and recommendations of the consultant are recorded on this sheet. This original sheet becomes a part of the permanent record.

At the time of discharge the patient is subjected to a thorough pelvic and abdominal examination. Detailed notes are made concerning the immediate postoperative findings, so that the later comparison may be made with the final result.

The patient is instructed to return to the Follow-up Clinic at the expiration of six weeks. She is given a card on which is written her name and the date for her return. No patient is allowed to leave the ward until this card is in her possession. To the emphasis given of the importance of this subsequent examination before the patient is discharged we attribute our large percentage of followed cases. During the past year we have followed 83.33 per cent. of our operative cases.

By no means do we depend entirely on the follow-up card and instruction given the patient at the time of discharge. Practically half the time of one secretary is spent in sending letters reminding patients of their follow-up appointments. One week before the time of the patient's first follow-up visit she receives a letter informing her of the date. If the patient does not report for examination, she is sent another letter, urging her to report on the next clinic day. To patients who live at places quite distant a special form of questionnaire is sent. The patient is asked to answer the questions and to have her physician report on her physical examination. If no response comes from these letters, a Social Service Worker is sent out to locate the patient, and urge her to come to the clinic for examination.

The Follow-up Clinic is held once each week by the resident gynecologist. After examination of each patient careful notes are made, appropriate treatment is ordered, and a date is fixed for her subsequent return. After an ordinary plastic operation the patient is asked to return at the end of six months, and again one year after operation. Inflammatory cases, where conservation of one or both ovaries has been practised, are examined every three months during the first year. Of course, the patients with malignancy are seen much more frequently. These patients return four weeks after discharge, and subsequent examinations are made at intervals of one to three months, depending upon the peculiarities of the individual case.

A separate laboratory of pathology is maintained by the Department of Gynecology. The laboratory is situated directly above the operating room. This location is of great advantage, in that reports from frozen sections in doubtful cases can be

had within ten minutes from removal of the tissues. All specimens removed at operation are examined and a detailed copy of the report is filed with the clinical record.

TREATMENT OF ENDOCERVICITIS BY CAUTERIZATION

Dr. Charles A. Behney

In the Gynecological Dispensary we have been using the nasal cautery in the treatment of cervical infections of various kinds for several years. We have not used this method of treatment in any case where there was present any other condition requiring operation under anesthesia, for there is no doubt that cauterization can be done more thoroughly when the patient is under the influence of a general anesthetic than without it. Cauterization without anesthesia, as these cases were done, must often be repeated several times before a satisfactory result is attained. By a thorough cauterization under anesthesia at the time of some other surgical procedure a cure can usually be obtained at a single sitting. While the cervix is insensitive to heat, the interior of the uterus is not, and it is practically impossible to do a complete cauterization of the cervical canal without introducing some steam into the uterus and causing pain and cramps. This discomfort, while not excessive, can in a very sensitive patient interfere considerably with the treatment. We overcome this to a great extent by warning the patient that there may be a little pain, and in that way securing better co-operation. The cases we have treated are those *generally* grouped under cervicitis and endocervicitis; that is, the congenital erosions, gonorrheal infections of the cervix, and infections following lacerations at child-birth.

A number of instruments are available for heating the cautery points. The Wappler transformer you see here is the one we use. It is small, compact, and inexpensive, and can be used with either direct or alternating current. The one disadvantage is the noise made when it is in use. This buzzing sound frequently makes a patient apprehensive and may be more disconcerting than the discomfort of the treatment. It is

well to allow the machine to run for a few minutes before starting the treatment in order to let the patient become accustomed to the sound.

For the cauterization we use a small nasal cautery knife, a cautery curet, and a cautery dome. The last is a cork-screw shaped instrument with which we cauterize the cervical canal. The other instruments required are a uterine dressing forceps, a bivalve speculum, and a single tenaculum.

The operation is commenced on the posterior cervical lip with the knife. Linear scarifications are made from the cervical canal downward to just beyond the area of erosion. By starting on the posterior lip one avoids obscuring the field by any blood which may be spilled. The cauterization is then continued completely around the cervix in a radial fashion at intervals of about $\frac{1}{2}$ cm. The linear cauterizations are made to the depth of the cervical muscle. When cauterizing the sides of the cervix scorching the sensitive vaginal wall can be avoided by retracting the cervix to one side or the other with the tenaculum. When a tear is present we cauterize directly across the tear instead of radially, and attempt to include some of the muscle in the cauterization. As these lines heal and contract, the edges of the laceration are approximated and the good results obtained after healing is complete are often remarkable. The radial cauterization should be painless.

The dome cautery is now inserted in place of the knife and is inserted cold into the cervical up to the internal os. The current is applied and the dome slowly withdrawn, first along the posterior wall and then around the interior of the cervical canal, endeavoring to reach every part of the lining of the canal. As the dome is withdrawn each time the collected mucus is burned off the instrument, and it is allowed to cool before it is reinserted. When the dome cauterization of the cervical canal has been completed there should be no oozing of blood or discharge, but the activities of the patient after leaving the dispensary very often set up bleeding which is seldom of any consequence, but may be sufficient to disturb a nervous patient. For this reason we warn the patient to expect a bloody dis-

charge, we insert a tampon, and instruct her to remove it in twelve hours and wear a sanitary napkin for four to five days.

The area which has been cauterized becomes necrotic and commences to separate from the underlying healthy tissues in from five to seven days. Coincident with this separation there is produced a foul-smelling watery discharge. To hasten the process we prescribe bidaily hot douches of "hychlorite" or "dibromin." Patients are instructed to return in five to seven days. At these visits as much of the necrotic material as possible is removed with a uterine dressing forceps, and when all of this has come away the discharge decreases considerably. Topical applications of silver nitrate (15 per cent. solution) or mercurochrome (2 per cent. solution) are made until the entire area is either covered with normal epithelium or ceases to show progress. In the latter case another cauterization is indicated.

In endeavoring to compile statistics in this work we encountered the customary difficulties met with in trying to arrive at conclusions about the dispensary type of case. Less than 50 per cent. of the patients continued under our care until discharged. The following results were obtained from those with whom we were able to keep in touch for at least three months after the last cauterization:

Symptoms.	Cases.	Per cent.	Cures.	Per cent.	Improved.	Per cent.	Unimproved.	Per cent.
Leukorrhea	84	100	57	68	15	18	12	14
Abdominal pain	47	56	25	53	12	25	10	22
Menorrhagia	19	23	12	63	0	0	7	37
Backache	43	51	15	35	2	4½	0	0

Treatments Required.—One treatment, 64 cases. Two treatments, 15 cases. Three treatments, 4 cases. Five treatments, 1 case.

Conclusions.—1. Most cases of endocervicitis can be cured by cauterization.

2. Every cervical infection, if untreated, may produce deeper and more serious infection of the pelvis.

3. Menorrhagia may be due to cervical infection.

4. Every case of leukorrhea indicates some pelvic abnormality which should be studied and treated.

CARCINOMA OF THE CERVIX

PATHOLOGY

DR. CHARLES C. NORRIS

Whether or not carcinoma is on the increase is a debatable point. A recent report from the United States Public Health Service stated that the deaths per 100,000 cases of carcinoma of the female genitalia were 51 in 1900; whereas in 1920 they had increased to 84, an advance of 66.7 per cent. In all forms of cancer the death-rate per 100,000 was 212 in 1900, and in 1920, 331.4, an increase of 46.9 per cent.

It is estimated that fully 30 per cent. of this increase is due to the more accurate methods of diagnosis now in use.

The predisposing factors to carcinoma of the cervix are first, age; second, child-bearing. It is probably not the actual tear, but the resulting cervicitis which accounts for the latter cause. The fact that chronic inflammations in the body of the uterus, with the exception of tuberculosis, are infrequent probably accounts for the greater prevalence of the disease in the cervix than in the fundus.

What part heredity plays is an open question. From Maude Slye's work it would appear that in animals definite hereditary tendencies can be produced experimentally; whereas Wood, of the Crocker Institute in New York, believes that heredity plays but little part in the causation of human cancer.

The clinical types of carcinoma of the cervix are as follows: ulcerative, papillary, and interstitial. In our series the ulcerative constitutes 54 per cent.; the papillary, 40 per cent.; the interstitial, 6 per cent.

The interstitial type is not only the least frequent, but is the most insidious, and becomes advanced before it breaks through into the portio or into the canal, and hence produces symptoms. The histologic varieties are the epidermoid, which may be subdivided into basal, squamous, and transitional, cell types, and the adenocarcinoma. Very early in the use of irradiation it was found that cells which were undergoing division were the ones most susceptible to the action of the rays. It would seem, there-

fore, that certain of these histologic types of cancer should be much more favorable to treatment by radium than others. This, however, has not been our clinical experience, at least, to any marked degree. Those cancers which are composed of a predominance of unripe cells are usually more rapid in growth, and give earlier metastasis than do those forms which are composed chiefly of the more adult type of cell, and whereas it is true that destruction of cells of the unripe type is more easily accomplished, the greater susceptibility of these cancers to irradiation is probably counterbalanced by their more malignant properties. Furthermore, the irradiation dose is based upon the destruction of the most adult type. This is a point which, however, has not been definitely determined.

Of 253 consecutive cases of carcinoma of the cervix sent into the Gynecologic Department of the University Hospital the following was shown:

Epidermoid	219
Adenocarcinoma	34
Stage 1, Confined to cervix	41
Stage 2, Borderline cases	41
Stage 3, Inoperable	45
Stage 4, Frozen pelves	109
Stage 5, Recurrences	17

Of these,

Clinical diagnosis was correct and positive in 206—81.4 per cent.

Clinical diagnosis was doubtful in 29—11.4 per cent.

Clinical diagnosis was benign, but the histologic examination showed malignancy in 6—2.3 per cent.

Clinical diagnosis was positive, but the histologic examination showed a benign lesion in 3—1.5 per cent.

It will be noted that the margin of clinical error in these cases was less than 4 per cent.

TREATMENT OF CARCINOMA OF THE CERVIX BY IRRADIATION

DR. F. E. KEENE

The use of radium in the treatment of carcinoma of the cervix was first started in Dr. Clark's Clinic in 1911. In those early days only the inoperable cases were subjected to radium,

the incipient and borderline cases being operated upon. From the beginning we have limited ourselves to the use of 100 mgm. of the radium element. In but a very few cases have we combined *x*-ray therapy with the radium treatment. As to the technic of application, it can be briefly summarized by stating that our radium is divided into one capsule of 50 mgm. and four needles, each containing $12\frac{1}{2}$ mgm. Almost without exception the dosage has been 2400 mgm. hours, and the radium has either been buried in the carcinomatous crater, or, in addition to the direct application to the carcinomatous area, the needles have been inserted into the tissues around it. During our earlier work most patients did not receive anesthesia, but in the past few years in every instance the application has been made under nitrous oxid and oxygen anesthesia, for by so doing it is possible to make a more thorough examination and to be assured of a more accurate application of the radium whether by capsule or needles. Formerly it was our plan to repeat the irradiation, more or less routinely, six weeks after the first application. At present we have the patient report to us within six weeks, and we are then governed as to the necessity of a second application by the appearance of the diseased area. Many times a repetition is not given because of the apparently complete disappearance of the carcinomatous area. We have long been of the opinion that the real benefit from irradiation comes from the first dose, although we may be wrong in this assumption, because from several clinics, particularly that of Heymann, excellent results so far as cure is concerned and no greater incidence of fistulæ formation have followed upon a repetition of the treatments at comparatively short intervals. During our earlier experience every case was subjected to treatment irrespective of the extent of the disease. We now believe that such a course should not be pursued, and that a very careful selection should be insisted upon, for in certain types of cases, as, for example, in widespread involvement of the bladder base, rectum or uterosacral ligaments, radium in sufficient quantities to favorably effect the carcinomatous process will lead to extensive necrosis and rectal or vesical fistula. Furthermore, pain of a most distressing

character may not infrequently result after subjecting these advanced cases to irradiation.

In summarizing the results of radium treatment of carcinoma of the cervix we must base our conclusions upon two very distinct groups, viz., the inoperable case in whom only palliation can be hoped for; and the early case in whom we may expect a certain degree of hope of cure. In the former there is no method of treatment at our disposal which offers so much in the way of relieving bleeding, foul discharge, and often even pain, as radium, and if this treatment should accomplish nothing more, it has proved itself a boon to humanity.

Of our more advanced cases, a local healing of the carcinomatous process has taken place in about 65 per cent., with temporary or permanent cessation of bleeding and discharge and restoration, for a time at least, of the individual to her normal mode of living. It occasionally occurs that the application of radium seems to stimulate the malignant process to greater activity, and while for obvious reasons it is often difficult to say definitely which cases have been so adversely effected, a rather careful observation would indicate that this occurs in about 15 per cent.

It is only comparatively recently that we have been able to form any conclusions regarding the palliative value of radium, but from clinics throughout the world statistics appearing from time to time would seem to enable us to draw fairly accurate deductions.

For the purposes of comparison a few statistics from some of the leading clinics are given below:

OPERATIVE TREATMENT OF CARCINOMA OF CERVIX

Graves:

Total number of cases applying	189
Operability	64 per cent.
Number of operations	119
Primary mortality	5 per cent.
Five-year cures	34.2 per cent.

Peterson:

Total number of cases applying	380
Operability	15.7 per cent.
Number of operations	60
Primary mortality	26.6 per cent.
Five-year cures	40.9 per cent.

Note: The primary mortality here would lead one to believe that a very radical type of operation is employed.

Martzloff:

Total number of cases applying	387
Operability	46 per cent.
Number of operations	178
Primary mortality	14.2 per cent.
Five-year cures	26.6 per cent.

Bumm (of Berlin):

Operations	157
Cures	49 per cent.

Schweitzer:

Total number of cases applying	443
Operability	40 per cent.
Number of operations	177
Primary mortality	6.78 per cent.
Cures	51.4 per cent.

Bonney:

Operations	100
Primary mortality	20 per cent.
Cures	43.2 per cent.

In reviewing these tables one is immediately struck with the wide variations in the percentages of operability, mortality, and ultimate cures, and this wide divergence is reported by men who are leaders in their specialty and whose operative skill is of the very highest.

RADIOTHERAPY FOR CARCINOMA OF CERVIX

Bailey and Healy:

Operable	27 per cent. cures
Borderline	24 per cent. cures
Inoperable	14.5 per cent. cures
Recurrent inoperable	22 per cent. cures

Heyman:

1914–1918	20.29 per cent. cures
1919	27.6 per cent. cures
1920	30.9 per cent. cures
1921	39.1 per cent. cures

Burnam:

Operable	50 per cent. cures
Borderline	31 per cent. cures
Inoperable	9 per cent. cures
Recurrent inoperable	11 per cent. cures

Bumm:

	1913.	1914.
Operable	28.5 per cent.	20 per cent.
Borderline	23 per cent.	19 per cent.
Inoperable		5.5 per cent.

Schmitz:

Operable	42.85 per cent. cures
Inoperable	6.3 per cent. cures

Seuffert:

Operation	110 cases—46 per cent. cures
Irradiation	77 cases—48 per cent. cures
Complete irradiation	43 cases—80 per cent. cures

It can be seen from the statistics just quoted that the results of radium treatment in the early cases of carcinoma of the cervix are equal to if not superior to those following radical operation. In Dr. Clark's Clinic the radical operation for carcinoma of the cervix has not been performed during the past three years. You will recall that Dr. Clark was one of the first to advise extensive radical operation for cervical cancer. Therefore the fact he has given up this procedure in favor of irradiation is positive proof of what our experience has shown. Unfortunately, it is very rare indeed that the patient presents herself with an early malignant lesion. In our last series of cases, which we have reviewed extending from 1919 to 1923 and comprising 214 cases, in only 13 was the disease confined to the cervix. Of these 13 cases, 7 were treated with radium alone, with 2 five-year cures, or 28.5 per cent.; 6 were treated by high cautery amputation of the cervix and radium, with 5 five-year cures, or 83 per

cent.; a total five-year curability of 53.8 per cent. The high percentage of cures following cautery amputation is worthy of note. While the series is too small on which to base definite deductions, we believe that it is sufficiently convincing to warrant further trial, and are of the opinion that the combination of radium and the cautery will be followed by infinitely better results than the use of one or the other alone.

For the purpose of reporting our cases we follow the classification suggested by the American College of Surgeons, which, of course, is familiar to all of you. The difficulty, however, in judging statistics based even upon this classification is self-evident, because what may appear to be a certain type of lesion to one man will in another's opinion be entirely different. Therefore, the question arises as to whether it is not better to base our results upon the entire number of cases treated irrespective of the extent of the lesion, for only in this way are we able to judge just how many cases are salvaged from a total number presenting themselves for treatment.

Within recent years the combined use of radium and deep *x*-ray therapy has been undertaken in many clinics. With this form of treatment we have had little or no experience, and therefore are not in a position to pass judgment upon it. From a few clinics the statistics reported seem to show that it may have beneficial results, but the question is still in doubt and only the test of time can settle it.

CARCINOMA OF THE FUNDUS

DR. CHARLES C. NORRIS

A different condition of affairs exists in the diagnosis of carcinoma of the fundus. This is a disease of advanced life—71 of our 101 cases were fifty-one years of age or over. Child-birth plays but little part as an etiologic factor; 26 per cent. of our cases occurred in spinsters.

Hemorrhage and discharge were the most important symptoms. It is probable that neither carcinoma of the cervix nor of the fundus, in themselves, influence menstruation. Hemor-

rhage occurring either just before or after the periods may simulate the prolongation of the normal flow. Metastasis to the ovary or inflammatory changes may also produce excessive or prolonged menstruation. We have purposely omitted from the symptomatology of both carcinoma of the cervix and of the fundus anemia, loss of weight, and pain, as these symptoms usually indicate an advanced and hopeless lesion. Hemorrhage and discharge are, therefore, the most important and outstanding symptoms. Owing to its location, hemorrhage is somewhat more prone to occur earlier in carcinoma of the cervix than it does in carcinoma of the fundus, and a history of hemorrhage following trauma is for the same reason more likely to be pronounced.

Only one-fourth of our cases of fundal carcinoma were seen in the early stages, and of our total series of this tumor, 34 per cent. were salvaged for three years. This would emphasize the necessity for early diagnosis. Absence of pain and non-recognition of the significance of irregular bleeding account for the majority of the advanced cases. Bleeding occurring after the menopause is often mistaken for a recurrence of the menstrual flow, and the condition is allowed to become advanced before it is recognized.

Carcinoma of the Cervix	*Carcinoma of Fundus*
Age: Most common between thirty-eight and fifty-five years.	Between forty-five and sixty-five years.
Average age: Forty-eight.	Fifty-two.
Rare in nullipara.	As common in spinsters as in nullipara.
Five times more common.	Five times less common.
Hemorrhage worth 90 as a diagnostic symptom.	Hemorrhage worth 75 as a diagnostic symptom.
Discharge worth 10 as a diagnostic symptom.	Discharge worth 25 as a diagnostic symptom.
Clinical varieties: Ulcerative, papillary, and interstitial.	Clinical varieties: Everting, inverting.
Histologic varieties: Epidermoid, glandular.	Histologic varieties: Always adenocarcinomatous.
Pelvic examination revealed generally an easily demonstrable lesion.	Pelvic examination revealed uterus sometimes enlarged or often normal in size and negative to the ordinary pelvic examination.

Carcinoma of Fundus

Early stage	24
Moderately advanced	53
Advanced stage	24
Total number of cases	101

Clinical diagnosis correct and positive	57 cases
Clinical diagnosis doubtful	24 cases
Clinical diagnosis benign, but histologic examination showed malignancy	20 cases
Of these, 15 were myoma.	
2 were metrorrhagia.	
2 were hyperplasias.	
1 was unsuspected carcinoma.	
Clinical diagnosis: Cancer of cervix, found to be fundal	1 case

We have found that postmenstrual bleeding generally indicated a malignant neoplasm. When the tumor developed at the time of the menopause the diagnosis was less clear. In fundal carcinoma we use in this clinic the test suggested by Dr. Clark, which is based upon the fact that the cancer is a friable, vascular tumor which bleeds readily upon touch. This test is performed as follows: The patient is placed in the lithotomy position; the external genitalia and vagina are cleaned as for an ordinary plastic operation; under sight, a sterile sound is passed to the fundus of the uterus and gently manipulated over the entire uterine cavity. If a carcinoma is present, a trickle of blood will follow. It must be understood that this test is by no means positive, and does not by any means take the place of diagnostic curettage. It may, however, be employed as an office procedure and is of distinct value.

The chief point of prognostic value in carcinoma of the fundus is the integrity of the myometrium. Metastasis by transtubal migration is probably frequent and this possibility must be borne in mind in performing the curettage. Tumor particles and cancer cells may be swept out through the tubes and find lodgment in the ovary. As an evidence of this occurrence we may point to the fact that in our 101 cases there were 8 instances in which ovarian involvement was present. This may readily be taken as an argument against diagnostic curettage. It must be remembered, however, that carcinoma of the fundus is a

malignant form of cancer and its diagnosis in the early stage is often obscure, and the surgeon's choice rests between further observation of the case and waiting for the development of the more pronounced symptoms, and a hysterectomy. Diagnostic curettage is, therefore, the lesser evil. As a matter of fact, our best three-year results were secured in those cases in which diagnostic curettage was performed, and can probably be explained on the basis that these cases as a group were much earlier than those in which a hysterectomy was practised.

The fact that transtubal migration may occur should, however, be borne in mind. We had one extremely interesting case which bears out this theory of extension. A girl twenty-one years of age was brought into the hospital with a diagnosis of incomplete abortion. After the usual palliation it was found that the hemorrhage did not cease, and a curettage was therefore performed. The histologic examination showed normal endometrium except for a small particle which was typical of adenocarcinoma. A histologic diagnosis of early carcinoma of the fundus was made. A delay of six weeks occurred before the patient could be returned for further operation. On account of the patient's age a second curettage was performed with similar findings. A hysterectomy was then performed, and a carcinoma of the fundus 1.5 cm. in diameter was present. A small cancer 5 mm. in diameter was present on the surface of the ovary. Both the ovarian and uterine cancers were of the same histologic type. I think that undoubtedly transtubal migration had occurred at the time of the first curettage. In view of the possibility of transtubal migration all traumatism in fundal cancers should be avoided, and in performing diagnostic curettage full dilatation should be secured, no intra-uterine irrigation should be performed, and intra-uterine packing is inadvisable. If irradiation is to be employed following the curettage, care should be taken that no piston-like action in the cervix occurs during the insertion of the rubber tube bearing the radium.

Divided according to the duration of symptoms, we found that 56.5 per cent. of the cases of fundal cancer were salvaged for three years, in those cases in which the symptoms had been

present for less than six months. Where the symptoms had been present from seven to twelve months, 31.2 per cent. were salvaged; and when symptoms had been present over one year, 17.8 per cent. were salvaged.

We have had little experience with the postoperative use of the deep x-ray therapy on these patients. Hysterectomy is the treatment of choice. Radium, however, offers a hope of cure in even the advanced cases, and is generally palliative in its effect in the remainder.

Because of the histologic character of this neoplasm, in which the cells are largely adult in type, at least 600 degrees mgm. hours should be utilized if irradiation is to be employed.

We believe that irradiation should be reserved for those cases in which operation is contraindicated. As a preoperative measure following diagnostic curettage it is probably valuable.

PROTEIN THERAPY FOR PELVIC INFECTION

DR. THOMAS H. LLEWELLYN

We realize that many of you are well acquainted with the use of "protein" in gynecologic conditions; nevertheless we thought it would be interesting to show how we have been using aolan in the pelvic infections of women, to give you a report of the cases studied, and the palliative effects derived in these types of infections.

Aolan is fat-free sterilized milk, and from our observations of its use we feel that we have a therapeutic preparation which, if properly used, will undoubtedly help in the treatment of these chronic residual inflammatory diseases. Our reason for selecting this preparation is because of its ready use, and not having to prepare and keep in stock sterilized milk.

While we have observed only a few of the more acute cases in the ward, our experiences have been directed chiefly to the ambulatory dispensary patient. These patients are mostly of the working class, where loss of time from work is an important factor, and if we can lessen their period of pain and disability,

also shorten their loss of time from work, we will advance a step further in the management of these types of ailments.

We have selected the deltoid muscle for the injection of aolan. We iodinize the skin and then insert a sharp needle deeply into the muscle, allowing the milk to go in very slowly. It must not be forced in under pressure, as it will cause pain. Given slowly, it will cause them no great discomfort either at the time of injection or later. The patients on their return visit do not complain of sore arms or having had any high temperature; in fact, there seems to be no constitutional effects whatever following the injections.

To carry out this problem we have selected only the case where there was no evidence of gross pathology indicating surgery; nor did we include those cases where syphilis was a complication.

The cases chosen for this work are:

1. Those with a low-grade infection, where on examination we find nothing except very exquisitely tender pelvic organs.

2. Those cases where we find a greater involvement of the broad ligament as indicated by a persistent chronic cellulitis.

3. Those cases where only the adnexæ are involved. The adnexæ, enlarged, exquisitely tender, and apparently bound down by adhesions.

4. The pelvic case which shows the uterus and adnexæ slightly bound down by plastic exudate. It is remarkable how the partially fixed uterus can, after a few injections, be brought up to its normal position.

5. Another type of case which will constantly visit the dispensary for weeks, even years, is that from whom the pelvic organs have been removed. These cases invariable show a marked thickening of the remaining portions of the broad ligament. They not only go through the turmoils of their surgical menopause, but are made invalids by this chronic persistent pelvic ache and pain.

6. Then, again, we have the young woman who, having had one tube and ovary removed, returns again to the dispensary with the remaining adnexæ much enlarged, swollen, and acutely

tender. In this type of case we have been especially encouraged since we are saving her from a second operation.

The symptoms complained of by these patients are the constant pelvic distress, pain in the groin, and backache. When we first began to use fat-free milk we were impressed by the remarkable relief of these symptoms following upon its use. Their relief from pain and pelvic discomfort impressed these patients so favorably that they willingly returned for further treatments. These injections are given at four- to five-day intervals, into the deltoid muscle, according to the technic previously outlined. The number of injections to be given depends upon relief of symptoms and upon pelvic findings. Some have gotten entire relief from five injections, and others have received as many as thirteen injections.

We cannot depend chiefly on the use of aolan, but must emphasize that all cervical infections should be appropriately treated. Furthermore, hot douches should be combined with this treatment in order to promote the absorption of these pelvic exudates.

I wish to demonstrate the charts of a few patients who are now under treatment in the Gynecologic Ward; each of these on admission presented the typical findings of an acute pelvic inflammatory disease, and in every instance the ordinary measures appropriate to the condition were employed. In several of these the inflammatory process showed rather stubborn resistance, with persistence of fever, pelvic pain, etc. It is rather striking to note how quickly both symptomatic and objective relief followed upon the use of aolan injections.

DESCRIPTION OF PERFORATING CHOCOLATE CYSTS OF THE OVARY (SAMPSON'S)

New as is the recognition of this lesion, various names have already been coined for it—endrometioma, perforating cysts, chocolate cysts, endometriosis, and Sampson's cyst. None of these are entirely descriptive, and perhaps the latter is in many ways the most satisfactory.

The cysts occurring in the ovary vary from the microscopic to the size of a goose egg or larger, generally being a few millimeters to 2 cm. in diameter. The contents may be liquid blood, coagulated blood, or degenerated blood, resembling semisolid chocolate. The tumors are generally multiple and often bilateral, and similar blood-containing cysts are often present in the posterior layer of the broad ligament, the uterus, culdesac, and in other areas. The ovarian cysts tend to rupture, and in healing cause cicatrices and puckering about the site of perforation. Prior to the work of Sampson these ovarian lesions were generally classified as hemorrhagic retention cysts of the ovary. These lesions may be observed in about 10 per cent. of all gynecologic intraperitoneal pelvic operations. This does not mean that they produce symptoms in all cases, indeed, recognizable clinical symptoms are the exception. They occur during the menstrual life of the patient and cease to develop after the ovarian stimulus has been withdrawn. Perforating cysts are the result of regurgitation through the tube of particles of desquamated endometrium and menstrual blood. Sampson believes that they occasionally also originate from particles of tubal mucosa.

Novak, of Baltimore, states that during menstruation the outer layers of the endometrium desquamate, practically *in toto*. This is not our conception of the menstrual phenomena. It is true that in some cases the entire superficial endometrium is thrown off at each period, as occurs in the well-known instances of membranous dysmenorrhea, where a cast of the lining membrane is frequently passed intact. In other instances of this condition the entire superficial layers may be thrown off not as a cast, but in various sized pieces. We believe that in the normal woman this does not occur, but that small isolated islands of the superficial layers of the endometrium are desquamated. It is probable that in some cases very little desquamation, if any, occurs.

As would be imagined, Sampson's cysts are most frequent in those cases in which there is an obstruction to the outflow of the menstrual blood, such as in cervical stenosis, retroflexion, myomata, etc. Adherent retroflexion is practically always asso-

ciated with perforating cysts, except in those cases in which frank adnexitis is present.

Certain objections have been raised to the Sampson theory of transtubal migration of particles of endometrium. It has been stated that the caliber of the intramural portion of the tube is too small to permit the backflow of particles of endometrium. It has been suggested that the deposits of endometrium-like tissue as seen upon the ovary and peritoneum are not true endometrial tissue, but are the result of the transformation of the endothelium. In Sampson's Laboratory curettage has been performed upon animals, and the curettings introduced into the peritoneal cavity through an abdominal incision and subsequently lesions similar to perforating cysts have been found. The fact that such lesions cease to develop after the ovarian stimulus is withdrawn and that they participate in the changes incident to menstruation and pregnancy are all strong arguments in favor of Sampson's theory. Furthermore, the cysts are especially prone to occur in those areas which would expect to be seeded by a transtubal migration. In the ovary these cysts are at first small, burrow into the substance of the organ, and at each menstrual period the lining membrane attempts to menstruate. This results in enlargement of the cyst and increased intracystic pressure which, combined with the perforating tendencies of the mullerian epithelium, finally results in rupture. At rupture the contents of the cyst and a certain amount of desquamated epithelium is cast out in the peritoneal cavity. In the healing of the cysts adhesions are formed, and finally the cyst re-forms, often larger than before. Thus numerous new cysts are formed from the desquamated ectopic epithelium not only in the ovary, but in the adjacent and dependent peritoneum. Long before the etiology of these cysts was determined I reported a case of an ovary which contained a considerable quantity of what appeared to be normal endometrium, and a few other such instances are present in the literature.

Not only do these cysts occur in the ovary and peritoneum, but Sampson has shown that the transplanted endometrium may gain access to the lymph spaces and there develop, the manner

of extension in this respect being very similar to cancer. The latter fact probably accounts for many of the adenomyomata of the round ligaments and inguinal region. There seems little doubt that these lesions may be the causative factors in the production of adenomyomata of the uterus and of the recto-vaginal septum. The culdesac frequently contains much of this ectopic endometrium. It is possible also that these tumors may be the starting-point for some of the ovarian cysts, both malignant and benign, as well as being a nidus for extra-uterine pregnancy. It is well known that for many years Webster, of Chicago, maintained that ovarian pregnancy could not occur unless mullerian tissue was present in the ovary.

As stated, many of these cases do not present a typical clinical picture, the symptoms produced by the adhesions generally being the chief feature. We have had one case in which a large perforating cyst of the ovary ruptured and simulated an ectopic pregnancy. In another, the preoperative diagnosis was torsion of a small ovarian cyst. We have had an interesting case in which it was possible to make the diagnosis by cystoscopic examination. This was one of a myoma of the uterus which palpation showed to be enlarged and cystic ovaries. On cystoscopic examination the myomatous mass was seen projecting into the bladder, and on both sides of these were small blood-containing cysts. This patient complained of dysuria and frequency, with intense irritability of the bladder at the time of the menstrual period, and after the cessation of period all vesical symptoms disappeared. This condition had existed for four years. Malignancy and tuberculosis were definitely excluded. Furthermore, laboratory investigation showed normal urine. Since the occurrence of this case two years ago we have had two somewhat similar cases, both of which were reported at a recent meeting of the American Gynecologic Society, and were, we believe, the first instances of vesical involvement by ectopic endometrium to be placed on record. Ectopic endometrium is slow in growth.

Even when observers are searching for these lesions, they are frequently overlooked, due to the fact that the larger cysts are

the ones generally examined. In these tumors degenerative changes have occurred in the lining membrane frequently, making their recognition difficult or impossible. It is the small lesion, a few millimeters in diameter, in which typical endometrium can be most easily demonstrated.

We cannot conclude without a tribute to Sampson for his splendid work of demonstrating the etiology and frequency of these lesions. No better research than this has been performed in the gynecologic field in many years.

CLINIC OF DR. JOHN H. JOPSON

PRESBYTERIAN HOSPITAL

APPENDICITIS IN CHILDREN

I WISH to say a few words this morning about my experience with appendicitis in children. Most of us believe that the first acute attack is usually the last. All the statistics will bear us out in this belief. The mortality in very young children is very high. After you get up to eight or ten years the mortality approximates that of adults, and that is too high also. I formerly thought that chronic appendicitis was not very common in children, but I have changed my mind. Lately I have been getting a good deal of help from the *x*-ray. Pediatrists have been slow in using the *x*-ray in the study of gastro-intestinal conditions in children. Kerley and Le Wald, in New York, have done most valuable work in the use of the *x*-ray in abdominal diagnosis in children, demonstrating thereby many congenital and some acquired pathologic lesions. If we bear in mind that retention of barium in the appendix after forty-eight hours is usually an indication of chronic appendicitis, I am certain we shall find more cases of chronic appendicitis among children than we thought existed. I am sure that a great many of the recurrent gastro-intestinal attacks, attacks of diarrhea, and especially of cyclic vomiting, so-called, are evidences of and due to chronic appendicitis. A doctor called me up this morning to see a case of so-called cyclic vomiting in a child of eight years. He said this condition had been going on for two or three years, and he had begun to think it was a case of appendicitis. I believe there is such a syndrome as cyclic vomiting that is not due to chronic appendicitis, but I believe that many cases are really chronic appendicitis, and that these examples are more common in children than we have been in the habit of thinking.

Case I.—The first case this morning is a child eight years old, a boy. He is of a nervous, not to say hysterical, type. Five days ago he was taken with pain while playing at school. One of our physicians saw him and sent him in here. The pain disappeared, but slight resistance of the muscles remained. His leukocyte count was 13,000. It would have been justifiable in view of his condition to operate on him at once, but when I saw him he had all the evidences of a subsiding attack. Night before last he had a sharp attack of colic which soon passed off and he went to sleep. He had a liberal diet that day and under the circumstances we decided that immediate operation was unnecessary.

I don't know how familiar most of you are with the Pool suction tube I am showing you. It is not new. Dr. Pool and Dr. Kenyon, of New York, devised this tube some time back, before the war, and I get more comfort out of it in cases of abdominal abscess than from anything else. Originally it was used with suction obtained by hydraulic means. Here we attach it to the electric pump. The minute we get into an abscess or into any condition in the abdomen in which there is fluid, we put it in and start suction. I almost always use a split rectus incision in appendicitis, and in all cases where there is evidence of perforation or abscess unless it is one of the large parietal abscesses. I was interested to hear Dr. Charles L. Gibson, of New York, say two or three years ago that in his follow-up system he found a much larger percentage of poor end-results in chronic appendix cases operated on through a gridiron incision than when the incision was such as permitted a thorough exploration of the abdominal cavity. Of course, the drawback of a split rectus incision is the frequent necessity of stopping to ligate the deep epigastric vessels. But this takes little time. I know a great many people do not agree with me. They take out an appendix through a gridiron incision and that is about all they see.

The appendix here does not look very bad. I did not believe there was an abscess here. He had no mass, and his appendix looks really remarkably free of gross disease. We will look around to see whether there is anything else. I don't expect to

find anything else in a boy of his age, and I presume if we find nothing else we shall regard this as a case of catarrhal appendicitis of a relapsing type. Certainly the operation was indicated by the symptoms. Occasionally you will find two or three tuberculous glands right near the ileocecal junction. Here we turn up an enlarged gland which is certainly of pathologic size, but it doesn't look to me like a tuberculous gland. Here I turn up a gland the size of an almond. If I should see it in the neck, I would say it was a lymphadenitis of a chronic or subacute inflammatory nature. It might be an early stage of tuberculous adenitis. Every now and again we operate on a case with a history where the symptoms are something like this, and turn up a tuberculous gland. At times we can feel the gland before operation. Recently I felt a little lump in a case somewhat similar to this, and suggested it might be a tuberculous gland. The child was a very well-nourished child, living under excellent hygienic conditions, but I could feel the lump there, and at operation not only found a tuberculous gland there, but a smaller one above in the mesentery of the colon. As a matter of fact, you can remove tuberculous glands in this region and have no further symptoms. One of our finest athletes had one or two caseous tuberculous glands at ten or twelve years of age which were removed at an operation for appendicitis. After that he had no further trouble and became a splendid physical specimen. We have two glands here. If they were caseous or cheesy I would take them out, but as they are not, I am going to leave them in. There is a condition of acute lymphadenitis in this neighborhood which some surgeons believe they can diagnose from appendicitis, but I cannot. I have removed the appendix and shall hope that it was the cause of the lymphatic hypertrophy. As far as I can see he has nothing further of a pathologic character.

QUESTION: Has he tuberculous lesions elsewhere in the bowels? Any ulcers?

DR. JOPSON: I find none here. Tuberculous peritonitis in children is a common infection. It has this characteristic which has been emphasized in a paper before the College of Surgeons,

I think, a few years back, by Dr. Charles N. Dowd, of New York, whose work has made him one of our great authorities on the surgical diseases of childhood. He pointed out that while in adults you can very often operate on a case of tuberculous peritonitis and excise a primary focus like a tuberculous tube, tuberculous appendix, even a tuberculous cecum, that in children this is seldom possible; that when you have a case of tuberculous peritonitis in a child it is almost impossible to deal radically with a primary focus. If you try to do so, you are more apt to get into trouble than to help the patient. We divide tuberculous peritonitis into the wet and the dry. The dry cases are not helped by surgery. They are cases for heliotherapy. Send them to an altitude subject to the rays of the sun, build up their general resistance and general immunity. In the wet cases, as a rule, all you can do is open the peritoneum, dry it out, sew it up, and then put the child through the same routine as you would in the dry cases. If you get a dry case and look for a collection or a primary focus, my experience is that you will be better off not to look too far or too hard, because you will start a lot of bleeding difficult to control. You will put in gauze to stop the oozing, and whether you succeed or whether you don't, you are very apt to have a fistula develop, and when you get a fistula with tubercular peritonitis in a child it is, as a rule, the beginning of the end.

I had one case of chronic hyperplastic tuberculosis of the ileocecal region in a child of thirteen with chronic obstruction of five years' duration, and with tremendous dilatation of the terminal ileum, which was as big as a child's stomach. The tuberculous process was limited to the ileocecal region, and a resection of the same, and of the first portion of the ascending colon was followed by recovery. This was unique in my experience. It is common enough in adults, when the tubercular portion of the cecum may be resected with a fair hope of recovery. When you have a tubercular appendix it is well, I think, to resect part of the cecum with it if it is difficult to resect the appendix alone. Otherwise leakage is prone to occur.

TUBERCULOUS ADENITIS IN CHILDREN

Case II.—The next patient is a child, a case of chronic tubercular adenitis of a very advanced type, a type one seldom sees in childhood. The boy is ten years of age, and, though I did not know it for some time, the boy is colored, but almost white. His history is that in May last he developed a swelling which is now bilateral, with associated fever and an infected condition of both tonsils. He was admitted in the summer and his tonsils had been removed when I saw him early in August. I found him with an irregular fever, with a more or less constant elevation above the normal. He had a very advanced pathologic condition, a very marked enlargement on the right side, and some on the left side of the neck. He had a history of a cough, but repeated examinations of the chest were negative and are still negative. In short, we could obtain no evidence of tuberculosis anywhere else in the body. There is no doubt, however, about the tuberculous condition of the neck. A chronic glandular enlargement in the neck in children, lasting over two months, is usually tuberculous. It may be luetic, but in my experience that is unusual. It may be pyogenic in origin, but in these cases there is usually suppuration and evacuation of the abscess in the course of a few weeks. When I first saw this patient I advised that he be sent away to the seashore for a time, as he was in poor condition and his tonsils had just been removed. When a case is advanced to the stage of caseation, tonsillectomy will not avoid an operation. If the case is an inflammatory one, the swelling may subside, and I believe even a very early tuberculous condition will subside. But if a cold abscess has developed, the tonsillectomy will help to improve the general condition, and will prevent reinfection after adenectomy, but the parents should be told that the neck operation will be necessary in any event.

As regards the question of operation as against vaccines and the *x*-ray, radium, quartz light therapy, climate, and hygiene, it is interesting to see how every new treatment that comes up is seized upon as a cure-all for everything, including tuberculous

adenitis. They were going to cure them with vaccines. Then the *x*-ray came along, and we find even today certain men who are protagonists of the *x*-ray who will say that operation is unnecessary. Then radium took the field. Two or three years ago an *x*-ray man, the late Dr. Boggs, of Pittsburgh, published a paper in which he said surgeons no longer operated for tuberculous adenitis. It so happens that for a number of years I have been interested in this question, and writing for the Surgical Clinics of North America I thought I would answer the challenge of Boggs. So I wrote to Dr. Dowd, whose experience is very large, as I have said. I also wrote to Dr. Pancoast, of the University Hospital of this city, obtaining his opinion. Dowd replied that a well-conducted operation in 85 per cent. of the cases would cure a tuberculous adenitis in one operation. This figure was based on the study of many hundreds of cases. There are 15 per cent. who are not cured by one operation. Some will require two operations, and some will develop tuberculosis elsewhere, more commonly a surgical type of tuberculosis rather than pulmonary tuberculosis, although, of course, there is no direct connection between the cervical chain of glands and the lungs. Even operated cases may develop coxalgia, tuberculous meningitis, and sometimes pulmonary tuberculosis, but in 85 per cent. of the cases we may be reasonably certain there will be a low mortality and that the end-results will be fortunate. Treatment with *x*-ray, radium, and other forms of non-operative therapy involves almost endless expense to the parents, treatment is prolonged, and we cannot believe that chronic tuberculous glands with multiple caseous abscesses in them can be cured without radical operation by *x*-ray or radium, or with both. It is true that chronic cases of adenitis, non-tuberculous in nature, will often subside under radiation, and will be listed as cured cases of tuberculous adenitis. Dr. Dowd divides the cases into three groups, according to the severity of the lesions. This case belongs to the third or most severe type.

On the right side of the neck of this boy the glands are enlarged from the mastoid to the clavicle. On the left side of the neck they are enlarged, as they usually are in the well-advanced

cases in children, in the upper third of the chain alone. On the right side you will see where some surgeon has made two oblique incisions. I believe these were done to drain collections of pus last summer, when he was in poor condition, rather acutely ill, and when his tonsils were removed. We advised deferring the radical operation at that time.

He went away to the seashore, returned improved in health, with a temperature running normal for some days, elevated on others, although he still had the two suppurating sinuses in the neck. At the time of his return they were discharging rather freely, and before I could do a radical operation I said the sinuses must be sterilized. If a case is brought you where a mixed pyogenic infection is planted on a tuberculous infection and you do a radical operation at this stage you are courting trouble. Our treatment during the last three or four weeks has been alcohol dressings on the wounds, and now they are practically healed. It is a bad case with a doubtful prognosis because the right side of the neck is as bad as you ever see in adults, and the left side is as bad as you usually see in children, but the boy is in good condition otherwise. He has been up and around the ward, and aside from the condition of his neck his general condition is excellent. When I have gone into the wards to make my rounds he has usually made them with me.

Here you will see that we are experimenting with our sandbags. We must do this until we can get the patient in the best position for exposure of this region. You will see, here, a little granulating area which was healed last week. The upper one has been healed for nearly a month.

As to the type of operation the question is very important. The introduction of the oblique incision has more or less changed the parents' point of view as to the cosmetic result. Oblique incision parallel to the fibers of the skin permits the patient to recover with a scar that is little more than a white line. This is of tremendous importance in private practice. Here we may have to go back to one of the earlier types of incision, such as were formerly associated with the names of Hartley and others, an incision running parallel to and a little more vertical than

the sternomastoid muscle. This is a procedure very seldom necessary in children. Fortunately, the submaxillary glands are not enlarged, but the supraclavicular group are enlarged. I do not like the vertical incision. When the oblique incision was first advocated in this country there was a good deal of discussion about it. Eisendrath, of Chicago, rejected it at first because he said it did not give enough room. I will see, however, what we can do with an oblique incision.

The greatest time is lost in getting started on these cases. It requires time to become oriented and to find out just how to go about the case. I want to find the posterior edge of the sternomastoid muscle because most of the involvement lies behind the muscle. The glands are in all stages of caseation. It is not a pretty case. At first the dissection is tedious. Here is a great mass in the posterior chain. It is hard to get forceps with which to hold the glands without tearing out. Once we clear the internal jugular vein, it is approximately easy sailing. We like to expose the most dangerous structures first and then work away from them.

The Allis dissector is useful, in fact, one of the most useful instruments we have for such dissection. Allis was noted for his ingenuity in devising surgical instruments and for his splendid anatomic work on fractures and dislocations. He was surgeon to this hospital when I was a junior surgeon. I think it is well to recall medical history of this kind from time to time. It is a fascinating study at any time, and just how fascinating it may be is evidenced by Harvey Cushing's recent *Life of Osler*. Cushing heretofore impressed us with his work in the field of physiologic surgery. He has added to his prestige by demonstrating a rare literary ability, and it is particularly fine that a man like Osler has found such a biographer. This is a little aside from the Allis dissector, which would seem a long way from Osler, but one is proud that in one's own time a man has completed a piece of work like that. Allis was an interesting man in many ways. He was very pious. He was working at one time in the hospital and spent a long while in operating on an ununited fracture. Just as he concluded the operation and had the part

ready to be put in plaster, mortised and screwed together, his assistant picked the limb up by the foot and broke the bones apart. This was too much for Allis. His language was fluent and free, but he concluded in his pious way, "May God forgive me for saying so." This is a favorite story of J. Chalmers DaCosta.

I have the internal jugular vein exposed and there is a little hole in it where a branch has torn off. I suspect that we shall have to ligate it. We have to tie the internal jugular vein occasionally in these cases, and I have never seen any harm come from it. In starting a case of this kind you must have plenty of assistance at hand, plenty of light, and plenty of time. When one starts a case of this character he does not know just where he is going to stop. A secondary hemorrhage is one risk, and I have had one fatality from this accident. In any doubtful case I ligate instead of putting on a lateral ligature. You may see now where I have ligated the vein. Here is the largest mass of glands. Before we go into the lower triangle we shall have to orient ourselves and see what is above. One of the worst accidents that can happen is to tear the internal jugular vein just below the base of the skull. In one such case in this hospital the surgeon put a clamp on it and had an assistant stay in the room of that young woman night and day for several days, when the clamp was safely removed.

I have cleared the upper triangle of this boy's neck through the oblique incision and without the sacrifice of any important structure. In a cold abscess with unmixed tuberculous infection I pay no attention to the cheesy material except to wipe it away. In operating on the submaxillary glands one has to avoid cutting the branch of the facial nerve supplying the depressor anguli oris. Sometimes it is pinched, and the paralysis of the corner of the mouth is only temporary. I have such a case under my care now.

Going from the upper triangle to the lower, I must make another oblique incision in the supraclavicular triangle. Before doing anything I shall look at the vein again. The upper part is dilated, the lower part collapsed. I am using the Allis dissector again. The glands here are cheesy and broken down and it is very difficult to get anything to hold a gland of that kind.

There isn't much chance for "feather edge dissection" in this kind of work. Fortunately, here the periglandular adhesions are not organized, and I can put my finger in and propel the glands out as one can in an acute adenitis.

We have here a type of tuberculosis in which there is no reaction on the part of the fixed connective tissue to localize the process, and so it runs wild. If we had good local reaction with inflammatory exudate that is quickly organized, the glands would not come out so easily and there would not be such rapid dissemination from above downward.

I shall not be able to do the left side today. If the operation in these bilateral cases consumes more than forty-five minutes, it is better to stop with one side finished. The pulse is now a little rapid. We have been working forty-five minutes, and so I believe cleaning this side of his neck is enough for today.

To close these cases we take out the sand-bag from under the shoulder, but leave the bag under the head. This done, the wounds relax and come together. We first tie everything we can see. I like a soft split rubber tube for drainage in an extensive wound of this kind. He will have to convalesce with his head on a pillow because there is a little strain on the skin of the neck when I have tied the sutures of fine silk. The cosmetic result depends upon exact proximation and fine sutures. I believe the two oblique incisions were better than had I made a vertical one. The exposure was adequate and the result, on the whole, is better. The operation has lasted an hour and five minutes.

It is important now to keep this boy's head on a flat pillow with a small sand-bag on each side and to keep him flat and quiet during the healing process.

I do not suppose we see one-fourth of the number of these cases that we saw twenty years ago. This is true also in England. In a discussion before the London Medical Society that I read last winter the same point was made. Is this because more attention is paid today to hygiene, or because children with diseased tonsils are operated on so routinely? Is it because the herds are inspected and the supply of milk is more sterile? Or is it a combination of these? In countries where supervision

of cattle and milk is lacking surgical tuberculosis is common in children.

This concludes the operations for today. There are a few cases which I have had sent up from the ward which may be of interest to some of you.

EMPYEMA IN A CHILD

Case III.—This is a case of early empyema operated on in September. His pneumonia was of recent date and he had had

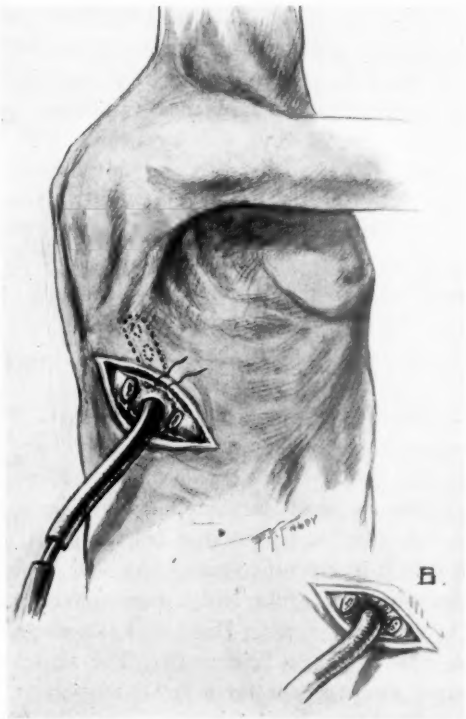

Fig. 71.—Rib resection and temporary closed drainage for empyema: The purse-string suture of chromic catgut includes intercostal muscles, reflected periosteum, endothoracic fascia, and pleura. Insert B shows suture tightened around rubber drainage-tube.

his crisis or lysis before he came in. On physical examination it was shown that he had a left-sided pleural effusion. He was operated under local anesthesia on September 16th, and a rib resection was done. I do a rib resection even in children because I believe it gives better drainage. If the ribs are close together in adults, they are much closer in children. The operation may be done in a few minutes and does not require a general anesthetic. After a rib resection we use closed drainage for a few days. I put in the tube, take a purse-string suture of chromic catgut, catch the pleura and intercostal muscles, and tighten the suture around the tube which is fastened by a stitch to the skin. The tube is coupled with another tube and run into a bottle suspended to the bed, and containing fluid sufficient to cover the end of the tube. By this simple means the case does not have to be dressed for several days and a continuous closed siphon drainage is maintained. This case was not dressed for three days. On the sixth day the tube came out. A short tube was introduced and daily dressings then instituted. There was a saving of dressings, a prevention of secondary infection, and all conditions maintained which favored early expansion of the lung.

CARBUNCLE OF THE FACE WITH DIABETES

Case IV.—This is a case of carbuncle of the face. The patient was operated on three weeks and a half ago by my associate, Dr. Pfeiffer. She had a blood-sugar of 0.358. Since the appearance of the carbuncle of the face she has had a small carbuncle of the scalp. Insulin, of course, has been a great help in all diabetic lesions. It is difficult to get an idea now of how bad this lesion was on admission. She had a tremendous undermining of tissue. As you can see, after three weeks of steady dakinization, we are now getting a fair result. The slough is almost entirely cleared away except for a small portion at the lower angle. The base of the ulcer is healthy granulating tissue. Her blood-sugar is now down to 0.167 and her urine has been sugar free for two weeks. She has been receiving 30 units of insulin a day with 1370 calories. The evidence of her good general

condition is seen in the good condition of the wound. None of the cases we have had of this kind of late has been more interesting to me than this woman. If you work up a well-balanced diet, burning up the carbohydrates with the aid of insulin, treating the lesion with continual dakinization, you will have a good result. We cannot practice a complete excision of a carbuncle on the face. It is too mutilating to cut it away entirely. For the last three years I have been in the habit of excising carbuncles in other localities with the cautery. This method was called to my attention by Dr. Scott, of Temple, Texas. It is done under gas, of course, and is tedious, but there is no hemorrhage. You raise your flaps by crucial incision, carry the cauterization into all the little pockets and foci, and then dakinize. The wound heals very well and no general infection follows.

LARGE INCISIONAL HERNIA

Case V.—This is a case of a very large incisional hernia which came in three days ago with symptoms of incarceration. She was put to bed and in the next two or three hours the incarceration relieved itself. Examination showed that she had an enormous incisional hernia that is irreducible and I detect a large defect in the abdominal wall. We are planning to operate on her in a few days. She is to be kept quiet meanwhile, having her bowels cleaned out, reducing them in size, so that there will be a chance of getting the bowel back into the abdominal cavity. You will see that the hernia is hanging down almost to her knees when she stands up, and she has a good deal of subcutaneous fat. In these cases of large defects in the abdominal wall Dr. Pfeiffer has been using the method of Gallie, of Toronto, closure by sutures of fascia. It is really a revival or extension of the McArthur method, presented twenty-three or twenty-four years ago. Gallie has introduced certain improvements and modifications of technic. The method is used with success in very large incisional hernias and in old relapsed inguinal hernias. If this patient desires to have us operate, Dr. Pfeiffer will use the fascial sutures in the McArthur-Gallie method.

RECTOSIGMOID CANCER

Case VI.—A patient was operated on June 19th for a growth in the rectosigmoid region with obstruction. We did the operation on her which has been systematized by Jones, of Boston. It is a two-stage procedure; in the first stage we mobilize the descending colon and sigmoid, with preservation of its blood-supply through the left colic branch of the inferior mesenteric artery, ligating the artery below the point where this branch is given off. Then a dissection of the growth and connective tissue, including all lymphatics with the mobilized descending colon, sigmoid, and rectosigmoid, which are pushed down into the floor of the pelvis and the peritoneal floor dissected and closed around the bowel at a higher level. We leave attached to the mobilized gut the adjacent connective tissue, fascia, and glands, all displaced into the pelvis. A permanent colostomy is then estab.ished. The bowel is not cut off below at this time, and therefore there is no danger of a peritonitis and little danger of pelvic infection. At the second stage, five to ten days later, we complete the resection by removing *in toto* the rectum, sigmoid, and all mobilized portions from below, excising the anus, resecting the coccyx, and working from below upward, withdrawing the mobilized bowel, and dividing and closing the bowel above. This is the method of Jones, but, unfortunately, it has never been well described in the literature, and although Jones has written a good deal about it, he has not published an exact description of the operation. I know the most popular method is that of Coffey, of Portland. In his method the bowel is divided from above at the primary operation, and the abdominal cavity is walled off down to the cut end of the sigmoid. Any method which divides the large intestine at this stage, filled as it is with bacteria of the most virulent type, creates a danger of infection. This danger is avoided in the Jones operation. The operation on this lady was done, as I told you, in June. She went home feeling very well. Then something happened which is not very unusual in these cases. I did not get as firm a closure in the end of the bowel left below the colostomy opening as I

might. The perineal sinus became infected again and she came back to the hospital for treatment for the sinus. She now feels well and looks very well. Dr. Pfeiffer has a good many cases of rectosigmoid carcinoma to handle, as well as tumors lower down. He believes the rectum should be resected in every case by the combined perineo-abdominal method, and believes that the only way to operate is to do a radical operation in every type of this disease however low down in the rectum it may be.

CHOLECYSTITIS WITH FISTULA INTO DUODENUM

Case VII.—This is a patient with a history of having vomited gall-stones. The physician who sent her in said, "You do not

Fig. 72.—Calculous cholecystitis with perforation of gall-bladder, abscess, and duodenal fistula. Gall-stones were vomited before operation.

have to worry about the diagnosis. She has vomited the stones." I said, "Send them in!" and here they are! The only way, of course, that a patient can vomit a gall-stone of this size is by formation of a cholecystoduodenal fistula, or some form of fistula

between the biliary passages and the gastro-intestinal tract. One result of such fistula formation is intestinal obstruction. This is commonly incomplete at first, and can sometimes be diagnosed as to the cause, viz., a gall-stone obstructing the bowel. This woman is thirty-five years of age and has had five attacks

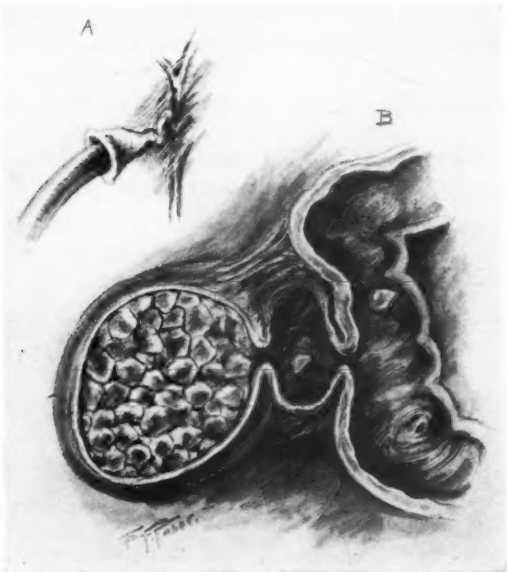

Fig. 73.—*A*, Method of resection and drainage of stump of gall-bladder where recent inflammatory exudate in. wall and adhesions around cystic duct render ligation of cystic duct difficult and dangerous. *B*, Calculous cholecystitis with perforation of gall-bladder, abscess between gall-bladder and duodenum, and perforation of duodenum. Diagrammatic as regards perforation of duodenum, which was apparently recently healed at time of operation.

in two years, lasting twenty-four hours at a time. She vomited these stones two weeks ago. When she came in she was still tender in the right hypochondriac region. She has had no other acute inflammatory attack. Her temperature has been up to 100° F. at times. She has never had jaundice. Her pain goes

through to her back and up to the shoulder. She was *x*-rayed and nothing was found. This is a case where I believe the sodium tetra-iodidophenolphthalein test of Graham ought to be used, because if she has a fistula one ought to be able to demonstrate it by this method. *x*-Ray for kidney stone revealed nothing. Her highest total acidity in the fractional test-meal was 60. She has 10,300 leukocytes. Her urine has been normal. She had typhoid fever five years ago. She has had 3 children.

Her pain began two years ago, and is unrelated to eating. Her symptoms when she came in were those of a subsiding attack of cholecystitis of moderate severity, and if I had to make a diagnosis I would say she had a cholecystoduodenal fistula.

(Operation subsequently revealed a gall-bladder filled with stones, perforation of the gall-bladder at its neck, abscess between gall-bladder and duodenum, and evidences of former perforation of duodenum at this point. She made a smooth recovery after cholecystectomy and drainage.)

CLINIC OF DR. A. BRUCE GILL

ORTHOPEDIC HOSPITAL, UNIVERSITY OF PENNSYLVANIA

OPERATION FOR OLD CONGENITAL DISLOCATION OF THE HIP

THE first case for operation is a woman, twenty-eight years of age. She was born in Russia and came to this country when about thirteen years of age. After growing up she has supported herself by working in a factory until within the past year, since when her condition has been such as to prevent her working.

She was born with a congenital dislocation of the left hip. No operation or bloodless reduction was attempted in her childhood and she has grown up with a dislocation. It is the pain and disability from which she suffers that finally bring her to the hospital. She is unable any longer to earn her own living and suffers so much pain that she has become more or less of a chronic invalid.

This closely resembles the history of all cases which come to us in adult life who suffer from congenital dislocation which has never been reduced. In this instance the acetabulum is obliterated, the head is displaced upward for about 3 inches, and is displaced backward. Nature has not formed a false acetabulum, so that there is no means by which the patient can have bony support for her weight. All of the weight on the left hip is thrown on the soft tissues. The stretching of the soft tissues which has resulted has been the occasion of her pain.

Up until recent years these cases of old unreduced congenital dislocation of the hip have been considered more or less hopeless. Nothing could be offered them in the way of operation which would give stability to say nothing of stability and mobility at the same time, but in recent years we have developed

an operation which will assure the patient of a stable hip and frequently of a movable one, as well. In every diarthrodial joint there are the two elements of stability and mobility, the relative importance of which may vary in different joints. In the lower extremities stability is of more importance relatively than is mobility; whereas the reverse is true in the upper extremity. Therefore, in reconstructing a new hip we desire first of all to secure stability so that the patient may bear weight without pain, and we desire also to secure as much mobility as is possible. When only a single hip-joint is to be considered the importance of the mobility is not so great as when both joints are to be treated. We must have good motion in at least one hip-joint.

In this case the problem is to construct an acetabulum so that the patient may have bony apposition for weight bearing. At what point will the acetabulum be made in the side of the pelvis? In a case so old as this it is practically impossible to bring the head down to the site of the original acetabulum. Even could we pry the head so far down, there would be so much tension on the soft structures that the patient would suffer from pain and even from paralysis of the sciatic nerve due to overstretching. There would also be danger of bony ankylosis in a newly constructed joint. On the other hand, it is desirable to reconstruct the acetabulum as far forward on the pelvis as possible so that the weight-bearing line of the body may fall as near as possible in the normal line which passes through the natural acetabulum. The lumbar lordosis and the waddling gait from which patients with congenital dislocation of the hip suffer is due in part at least to the posterior and not to the upward dislocation of the femur.

Description of Operation.—The construction of a new acetabulum in the side of the pelvis has been rendered more easy by the publication of Dr. Smith-Peterson, of Boston, who called attention to the possibility of subperiosteal approach to the hip-joint from above. This approach we employ in the present instance. An incision begins at the anterior superior spine and runs backward along the crest of the ileum for a distance of 4

or 5 inches. This incision is then continued downward from the anterior superior spine between the tensor fascia femoris muscle and the sartorius for a distance of 4 or 5 inches. The deep fascia is divided, the crest of the ileum is exposed, and the incision is then continued through the periosteum along the outer lip of the crest of the ileum. The periosteum is then, by blunt dissection, elevated from the ileum as far downward as the attachment of the capsule of the hip-joint to the superior aspect of the acetabulum. At this point the periosteum blends with the capsule and is firmly fastened to the bone. The tensor fascia femoris muscle and the anterior portion of the gluteus medius muscle are thus turned downward in this flap. The anterior portion of the incision is carried, by blunt dissection, between the sartorius and the tensor fascia femoris muscles. The periosteum is freed from the anterior superior spine and from the anterior margin of the pelvis as far downward as the anterior inferior spine of the ileum by sharp dissection as it is firmly attached to the anterior border of the ileum. The surgeon, therefore, has freely exposed the side of the pelvis from the anterior inferior spine backward. The periosteum and the capsule of the hip-joint are next cut away by means of a knife or scissors from the anterior inferior spine backward for a distance of about 2 inches. This incision opens the way into the original cavity of the acetabulum. On inspection of the acetabulum in this case it is found that there is no acetabular cavity, but the site of the original acetabulum is practically level with the remaining part of the innominate bone. Usually at this stage the operator is able to insert his finger into the capsular cavity and to turn his finger upward and backward within the capsule, through the constriction which is present below the head, and up into the capsular cavity containing the head of the femur. In this present case no such opening can be found. If one is able to pass the finger or a curved hemostat into the acetabular cavity and up within the portion of the capsule containing the head, it is then possible to cut down directly upon the head of the femur, using the finger or the hemostat as a guide. The head of the femur can then be seen lying within its capsule. The incision directly over the head must

then be carried clear down to meet the incision in the capsule along the upper aspect of the acetabulum. We therefore have two incisions into the capsule which join each other at a right angle about the middle of the upper portion of the acetabular brim. Through this incision the head is dislocated into the wound. It is found now that the head can be brought well forward to the anterior brim of the pelvis, usually to a point in the region of the anterior inferior spine. In children it is possible even to reduce the head to the position of the original acetabulum, but in these older cases, as already stated, this is impossible or inadvisable. If the head can be brought forward and down by abduction of the femur to the region of the inferior spine, a small excavation is made in the side of the pelvis where the head lies. This excavation is usually made by beginning at the site of the original acetabulum and removing with a curved gouge the acetabular brim just beneath and posterior to the inferior spine. This enlargement is continued upward until the head can be placed in it. It is made only so deep as to retain the head when the femur is abducted to an angle of about 15 degrees. The head is now placed in this excavation and an assistant holds the femur abducted and usually slightly internally rotated in this position until the operation has been completed and a plaster cast applied. The surgeon now turns down a bone-flap above and behind the head of the femur. If he is careful he can dissect loose this bone-flap, which consists of the outer table of the ileum, and bend it gradually downward so that it does not break off at the base. It is found that this flap can be bent downward to fully 90 degrees or more. The space which is left above the flap is then filled in with pieces of bone which may be removed from the side of the pelvis and the crest of the ileum. These pieces and chips of bone are pressed firmly in place and they keep the flap wedged downward. The edges of the capsule are then found to fall over this flap. The periosteum with the muscles attached is sutured to the crest of the ileum, the wound is closed with twenty-day No. 1 chromicized catgut, a rubber-dam drain is inserted into the posterior aspect of the incision for twenty-four hours, plaster is applied with the femur placed

as already indicated. This plaster cast is removed at the end of six weeks and Buck's extension is applied. The patient is then encouraged to make passive and active motion in the hip-joint while the extension maintains a moderate abduction and prevents too much tension on the bone-flap. Baking and massage of the hip are employed together with daily passive motion by attendants. At the end of another six weeks, that is, twelve weeks after the operation, the patient is gotten out of bed on crutches and is allowed to begin gradually weight bearing and function.

This operation has been found invariably to give a stable hip. Nature reproduces a sufficient acetabulum to contain the head and to bear weight. The amount of mobility secured varies in different cases. When the head of the femur is very badly deformed, as it frequently is, we cannot expect as good motion in a newly formed hip-joint. Again, if too deep an excavation is made in the side of the pelvis, I think the new bone formation at this point may interfere with motion.

This type of operation has been employed in patients from five years of age upward to adult life. Our custom in treating congenital dislocation of the hip is to reduce the hip bloodlessly if it is possible to do so. This can usually be accomplished in children under six years of age. In some instances it seems impossible to maintain reduction when the patient begins to walk after the femur has again been brought down into extension and adduction. Redislocation occurs because the acetabulum is insufficient to hold the head or because the acetabulum has been filled up with fibrous tissue, or because the capsule has been forced into the acetabulum before the head, when the head cannot be forced through the constricted part of the neck of the capsule. When it is found, therefore, that bloodless reduction cannot be secured or cannot be maintained after long persistent trial, we have not hesitated to do the open operation. In all cases operated on there has been evidenced at the time of operation an insuperable obstacle to bloodless reduction, even in the younger cases.

Finally, this operation offers to numerous individuals who are apparently hopeless cripples an opportunity to become re-

established in life and resume a wage-earning occupation, and it offers them the opportunity to be free of disabling pain.

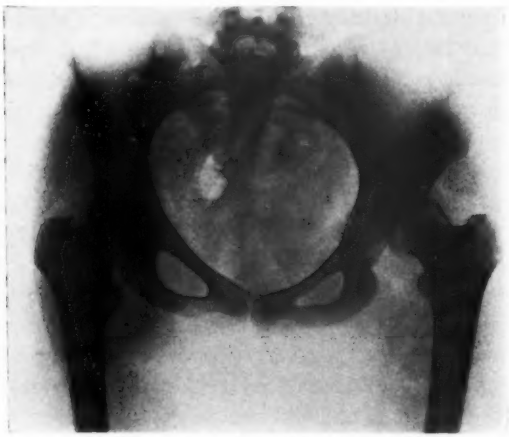

Fig. 74.—Congenital dislocation of hip.

Fig. 75.—Case shown in Fig. 74. Reconstruction of acetabulum.

Lantern Slides.—Figures 74–79 illustrate several cases which have been operated upon by this method. It will be seen in them

Fig. 76.—Congenital dislocation of hip.

Fig. 77.—Reconstruction of acetabulum of case shown in Fig. 76.

how a splendid acetabulum can be formed either at the site of the original acetabulum or just above it, posterior to the inferior spine of the ileum.

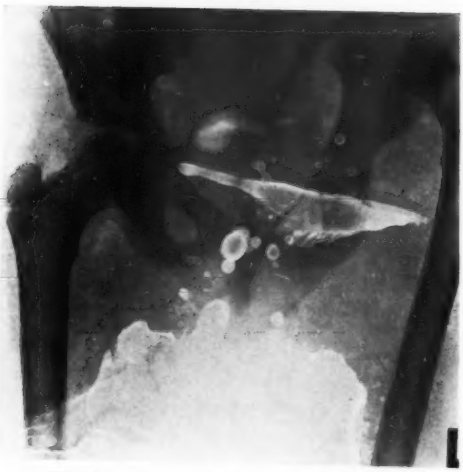

Fig. 78.—Congenital dislocation of hip.

Fig. 79.—Same as Fig. 78 after operation.

BONE TRANSPLANT FOR SCOLIOSIS

The next case is a boy fifteen years of age who has marked lateral curvature of the spine, or scoliosis, due in this instance to infantile paralysis. He had infantile paralysis when a child, and the muscles of the lower extremities and some of the muscles of the back were effected. He developed in consequence of this paralysis a very marked lateral curvature of the spine. Such a lateral curvature of the spine can be somewhat improved by means of certain treatment. The means employed in this case to secure some improvement in the curvature was to keep the patient in bed with head and foot extension and to make, in addition, lateral traction over the point of the curvature, while the two opposite points of fixation are at the pelvis and the shoulder. This was continued over a period of about six months and has produced rather marked improvement in the lateral curvature, but if we would get this patient up and about again he would relapse. No brace would prevent this relapse. Therefore we have been forced to resort to some more radical means of maintaining the correction which we have been able to secure or to prevent this curvature from getting worse. This procedure consists in securing an ankylosis of the spine, either by means of the Hibbs method or by means of a bone transplant taken from the tibia as described by Albee. In these cases of lateral curvature we prefer to use the bone transplant wherever possible, as we thereby secure an immediate immobilization of the spine and a thorough fixation after healing has occurred. Our method of applying the bone transplant to the spine varies slightly from that described by Dr. Albee.

Description of Operation.—An incision is made along the concave aspect of the spine about 1 inch from the spinous process for the desired distance. The ends of this incision are curved over to meet the spinous processes. The skin and superficial fascia are then dissected laterally until the spinous processes are exposed. Beginning with the upper spinous process, which it is desired to include in the operation, with a knife an incision is made through the fascia and periosteum at the tip of the

process. The periosteum is then dissected from the side of the spinous process on the concave side of the curvature, and the subperiosteal dissection is continued along the lamina as far as the base of the transverse process or even slightly beyond the base. The next spinous process below is then denuded of periosteum in the same manner. The interspinous ligament between the two spinous processes is then divided and a small pledget of gauze is packed in tightly to control hemorrhage.

The vertebræ below, as far down as the operation is to be carried, are prepared in the same manner. This method of dissection is practically that described by Dr. Hibbs, only that it is not carried to so extreme a degree. With a sharp thin osteotome the sides of the spinous processes and the posterior aspect of the laminæ are then dug up. We have, therefore prepared a trough of denuded bleeding bone consisting of the sides of the spinous processes and the posterior surfaces of the laminæ. And the erector spinæ muscles are covered on their undersurface by the periosteal lining which has been dissected from the vertebræ.

A bone-graft is next taken from the antero-internal aspect of the tibia. The length of the graft is usually as long as can be obtained from the tibia. This transplant is then laid on the laminæ of the vertebræ and against the spinous processes. In younger individuals the transplant can be bent around so that it fits the curvature. In older individuals it may not be possible to have the transplant in contact with the spinous processes in the central part of the curvature, but it is in contact at least with the laminæ or the transverse processes throughout its entire extent.

The dozens of small fragments of bone which have been dug from the spinous process and the laminæ remain *in situ*. The transplant is held in its place by suturing the periosteally lined soft tissue flap back to the tips of the spinous processes. The transplant, therefore, lies in contact with bleeding bone on two sides, and is covered on the other two sides with periosteum so that there is every opportunity offered for callus formation and firm bony union. The skin is closed with catgut suture and a body cast is applied. The patient is kept in bed for six weeks

with the cast on. At the end of six weeks the cast is removed and a brace is applied, but the patient is not allowed out of bed until the expiration of twelve weeks. We believe this time necessary to allow thorough bony union to occur.

The results from this type of operation have been quite satisfactory. We have many children under our care who before operation were unable to sit erect without supporting themselves with their hands, and who were unable to feed themselves because they could not raise their hands to their heads without collapse of their spines. After operation these children can sit alone without support, they can walk by means of braces or crutches, if necessary, because of the paralysis of the lower extremities, they are able to feed themselves, and to dress themselves. In other words, their backs have been made stable. If the transplant has been long enough and if it has been properly placed in the back, we have found that relapse of the curvatures does not occur. We have had such patients under our observation and care for a period of at least eight years, and find the result is satisfactory at the end of this period.

The method of treatment may be used in the so-called idiopathic scoliosis. After we have obtained as much correction as we can by means of plaster casts or by means of traction in bed, then we employ this type of operation to secure fixation of the spine and prevent relapse.

STOFFEL OPERATION FOR SPASTIC PARALYSIS

The next case is one of spastic paraplegia which has been present since birth. I will not enter into a discussion of the causes of spastic paraplegia in children beyond stating that, in my opinion, the vast majority of cases are due to brain injury which occurs during birth. This injury produces in the first place, hemorrhage; and in the second place, if severe, even laceration of the brain. Of course there are other well-known causes for this type of paralysis.

The older methods of treating spastic paraplegia were by means of tenotomy of the muscles which were contracted. By

this means patients may have their lower extremities straightened out and they may learn to walk. In certain cases very beneficial results were obtained. In other cases the results have not been good. We have seen cases in which the tendo achillis was cut, which later on developed marked talipes calcaneus. This occurs because, during the early years of life at least, the contracted muscles are spastic, but are not structurally shortened. Under anesthesia, for example, the spasticity disappears and it is seen that there is no real shortening of the muscles. The talipes equinus, for example, can frequently be corrected under anesthesia without any operative procedure, but the relapse occurs because the tendo achillis is so strong that it overcomes the anterior muscles of the leg and the foot goes into equinus. It is not our custom, therefore, to tenotomize or lengthen tendons unless it is found that the contracture remains under anesthesia.

Foerster attacked the problem by dividing the posterior spinal roots to the affected extremities. The usual conception of the production of spasticity is that the peripheral arc, consisting of the motor cells of the spinal cord, the efferent spinal nerves, the muscles and tendons, and the afferent sensory nerves, are unduly excited and are without the inhibition or control of the cerebrum. This inhibition, of course, has been lost through the injury to the upper neuron. Foerster, therefore, attempted to lessen spasticity by dividing the peripheral arc on the sensory side. Tenotomies divide the peripheral arc at the muscles or the tendons. The Foerster operation does produce a lessening of spasticity, but it is a dangerous operation, and it is not to be used generally.

Adolph Stoffel attacked the problem by a selective neurectomy of the motor nerves. For example, when the patient has a talipes equinus, the internal popliteal nerve is exposed in the popliteal space, and some of its branches which go to the various calf muscles are excised. This produces a definite paralysis or weakness of the calf muscles. It secures more of a balance of power between the anterior and posterior muscles of the leg; it lessens the spasticity, and it cures the contracture of the tendo achillis. The operation itself is not a difficult one, nor does it

endanger life. For spasticity of the adductor muscles of the thigh the obturator nerve is exposed, and usually the entire anterior division, which supplies the gracilis, adductor longus, and a portion of the adductor brevis muscles, is excised. This leaves the posterior division of the obturator nerve intact. The adductor muscles are thus sufficiently weakened to allow the patient to abduct the thigh and to walk without the typical scissors gait. When the hamstring muscles ae contracted so that the knees are maintained in a flexed position, operation is done upon the branches of the sciatic nerve which supplies the various hamstring muscles. The same principles are applied to spasticity of the upper extremity.

Description of Operation.—This child, six years of age, has a typical spastic paraplegia. When he attempts to walk, he stands on the balls of his feet with knees slightly flexed and legs crossed, one over the other. The first operation is on the internal popliteal nerve. Incision is made longitudinally over the center of the popliteal region; blunt dissection is made in the popliteal space until the internal popliteal nerve is observed and isolated, and is freed from the surrounding tissues and raised from the wound on a hemostat or other instrument placed crosswise beneath it. It is observed that the first branch to leave the internal popliteal nerve in the popliteal space is one going off directly from its posterior aspect. This is the cutaneous branch which supplies the skin of the calf of the leg. The next branches seen to leave are those which go to the internal and external heads of the gastrocnemius muscle. If one will make careful delicate dissection of the remaining portion of the nerve below the exit of these branches, he will be able to separate the internal popliteal nerves into a number of bundles. On testing these bundles with an electric current or on twitching them with the handle of the scalpel, it can be seen that each bundle supplies its own muscles. The bundle which supplies the soleus muscle and the bundle to the tibialis posticus and the bundle to the flexor muscles of the toes can all be isolated and distinguished in this manner. In cases of mild contracture it is my custom to excise approximately one-half to three-fourths of

each branch to the gastrocnemius muscle. In more severe cases we may completely excise the branches to the gastrocnemius and, in addition, take a portion of the nerve supplying the soleus muscle. If the foot is inverted by contracture of the tibialis posticus, the nerve supply to this muscle also may be excised in part. The extent of the neurectomy is determined by our previous examination of the condition of the child, by the amount of contracture which is present, and by the amount of resistance which is necessary to overcome contracture. After excising the amount of nerve supply determined upon, the wound is closed and dressing applied.

If it is found that the tendo achillis remains contracted under anesthesia, it may be stretched if this can be done easily, or lengthened, if stretching is impossible. In such case the lower extremity is dressed in a plaster cast. Otherwise no cast is applied.

The obturator nerve is exposed through an incision extending from the pubis down along the tendon of the adductor longus muscle. The adductor longus muscle is held forward by means of a retractor and the obturator nerve may be seen beneath it. The anterior division consists of three branches, one branch to the gracilis, one branch to the adductor longus, and the third to the adductor brevis. These branches are isolated and clamped with hemostatic forceps. The entire anterior division is then excised. This operation is very simple and easy if the surgeon does not attempt to dissect through muscle substance, but carefully makes blunt dissection between the muscles. If the adductor muscles are still contracted under an anesthetic, there is no objection to cutting the tendons at the same time that the nerve is excised.

The author has been employing the Stoffel operation for the past twelve years, and believes that it is an operation which is more generally applicable to cases of spastic paraplegia than is any other operation. I have never seen it do any harm and it usually does a great deal of good in relieving contracture and lessening spasticity, and in enabling the patients to walk or to use the upper extremity in a better manner.

CLINIC OF DR. J. D. ELLIOTT

HAHNEMANN HOSPITAL

DR. J. D. ELLIOTT: **Tumors of the Breast.**
DR. S. W. SAPPINGTON: **Some Points in the Pathology.**
DR. J. W. FRANK: **Treatment With *x*-Rays.**
DR. F. C. BENSON, JR.: **Treatment With Radium.**
DRS. J. D. ELLIOTT AND W. M. SYLVIS: **Pancreatitis—Varicose Veins.**

Dr. Sappington: I am exhibiting these 10 Kaiserling-mounted breasts for the purpose of illustrating and emphasizing two points in the pathology of the mammary gland.

The first point I wish to make is the matter of gross diagnosis of breast tumors. MacCarty, in discussing Bloodgood's paper, stated that he who operates for malignancy removes 1 out of 20 breasts unnecessarily, while he who operates on a benign diagnosis fails to remove 1 out of 10 breasts that should be amputated. He also stated that the gross diagnosis is a guess in 1 out of 10 cases. Ewing, on the other hand, finds that clinical carcinoma of the breast is almost always clearly recognizable in the gross, and deprecates frozen sections as tending to discourage the careful gross examination. He said, "Having made more errors by the frozen section in breast cases than by the gross examination, I have not resorted to frozen sections in this field for many years, but rely almost entirely on gross inspection of the breast tissue." Our own experience, based on the gross diagnosis followed by microscopic examination for confirmation, leads us to strongly advocate the careful gross inspection of the breast for diagnosis with a microscopic examination in doubtful cases. If surgeons would routinely section and study breasts they would soon attain an experience that would give them a correct diagnosis in the vast majority of cases.

The second point I wish to make is that breast pathology would be considerably simplified if we accept McFarland's conclusions, at least tentatively, in his study of "Residual Lactation Acini in the Female Breast." The multiplicity of names that have been applied to what is probably nothing but abnormal involution of the active or lactating breast indicates the confusion of our knowledge of the subject. Further, the tendency to regard such breasts as adenomatous with the constant menace of malignant change has reached even to the laity. If we rule these cases of so-called chronic mastitis, diffuse fibrosis, cystadenofibroma, cystic breast, etc., entirely out of the tumor class, and accept the conclusion that such mammary glands are not in any more danger of cancer growth than any other breast, we will aid in righting a troublesome error.

Dr. Frank: Soon after the discovery of the so-called *x*-rays by Conrad Roentgen in 1895 they were employed in the treatment of breast malignancies, at times with some degree of success, at others, no success at all, and, in fact, many cases were made worse.

It was believed at that time that not enough rays reached the tumor mass to properly influence it, and the cause was attributed to inefficient apparatus, especially the tubes. However, in 1912 Coolidge brought out the hot cathode tube which was one of the greatest steps in advance since the discovery of the rays.

This tube is capable of correct regulation as to penetration and milliamperage, a condition not possible with the old style gas tubes, which were constantly changing in degree of penetration and thereby in biologic effect. During all this time and, in fact, until about two years ago the aim of roentgenologists was to administer a lethal dose to the pathologic cells without injuring the normal ones. With the Coolidge tube and by a cross-fire method this was indeed possible, but even then the results were not satisfactory in all cases, there seemed to be something wrong, something that retarded or prevented recovery, and sloughing often resulted from overdosage. This caused a question to arise in the minds of some of us as to whether this was the proper method of attack, and to Butts belongs the credit

for investigating the true or curative action of the rays, which he found was the result of the action of secondary rays (negative electrons). With this known action of the negative electrons in mind we began investigating from a clinical standpoint, and have found that when we apply the proper amount of negative electrons to each malignant cell a restoration to normal is brought about and a disappearance of the tumor results. This is due to the curative action of the negative electrons in bringing the electrically unbalanced pathologic cell (those cells showing increased positive current) back to a normally balanced cell, in which state malignancy cannot exist, as compared to older methods of attack, namely, the caustic action.

We now believe that as soon as a technic is evolved which will enable us to apply the proper amount of negative electrons to all cancerous cells, we will be able to restore the area involved.

The future of Roentgen therapy (using the negative electrons), I believe, is a very bright one.

Dr. Benson: We do not advise the use of radium in the primary pathology of operable breast malignancy, but feel that it is frequently indicated as an adjunct to surgical procedure, especially in the treatment of present, or suspected, axillary involvement.

Our belief in the efficiency of this method, as being both alterative and prophylactic, is based upon the very small number of axillary recurrences in quite a large number of proved breast malignancies, so treated, over a period of five years. In this series of over 70 cases the axillary recurrences have been approximately 3 per cent.

In this work we use at least 50 milligrams of radium element divided into four tubes and screened with 1 millimeter brass and 2 millimeters sterile rubber, introduced into the axilla immediately following operation. These tubes are so placed that the entire axilla is exposed to the radiation, being careful, however, that they are not placed in close contact with major blood-vessels. They are allowed to remain for twenty-four hours (giving 1200 milligram hours beta-gamma radiation), are then removed, and the provisional sutures tied. Such technic

has given rise to no sloughing, infection, or delay in wound healing.

For alterative or prophylactic treatment of the supraclavicular and neck areas, chest wall, lung, and mediastinum we feel that the use of the *x*-ray is to be preferred to radium. In skin recurrences of limited area we have had favorable results from the use of radium, introducing the element-bearing needles into the pathology or implanting it with bare tube emanation "seed." One 12½ milligram needle is used to each square inch of pathology for four hours (a beta-gamma dosage of 50 milligram hours). When the bare emanation tubes are employed we implant up to ¼ millicurie per cubic centimeter of pathology (each implant during its "life" of some thirty days giving a dosage of approximately 25 millicurie hours (excess beta radiation).

Following the use of either of the above methods we have had a number of these limited recurrent lesions to disappear and remain apparently cured, but in the wide-spread skin recurrences we feel that the modified *x*-ray is to be preferrrd. It may be noted that the changes in the axillary glands and skin lesions were due to alteration in construction rather than tissue destruction.

We feel that the use of radium in breast malignancy has marked limitations, but that it is valuable as an accessory to other methods of therapy.

Dr. Elliott: Perhaps the great diversity of names applied to lesions of the breast may have advantages in the laboratory, but such fine differentiation is not necessary clinically and is often puzzling. If we except rare conditions, such as chronic abscess, tuberculosis, angioma, or lipoma, the benign swellings or growths can be divided into the so-called chronic mastitis, fibroma, and adenoma. The term "fibro-adenoma" is not very exact. While there is nearly always an increase in both the epithelium and fibrous stroma, one of these tissues is the predominant element and gives character to the tumor. Fibromas originate in the soft, grayish, semitranslucent connective tissue surrounding the ducts and acini and push and distort the ducts as they grow. They are met in younger life—the two largest

fibromas removed in this clinic were in girls under twenty years of age. They may grow quite rapidly, and though they are not attached deeply they do not move so freely on the deeper structures as do the adenoma. The skin is not invaded, it may become bluish and discolored from pressure. This tumor does not tend to cyst formation, but usually shows myxomatous degeneration and may develop into a sarcoma—a periductal sarcoma. The microscopic pictures of fibroma and sarcoma are very similar, but the latter is much more vascular and its infiltrating character is shown by its destroying the ducts instead of pushing them aside by pressure. Fortunately, such sarcomas are not very malignant, or are only locally so, for their complete removal usually affects a cure.

Adenomas are met in young adult life, although they may develop about the time of the menopause or even afterward. Their diagnosis is usually easy. They may be multiple, they do not often obtain a large size, are very freely movable, in younger patients they are near the periphery, and they give rise to little inconvenience unless occasionally they become painful. When a malignant change occurs a carcinoma develops which differs in no way from the ordinary breast carcinoma. While enucleation of benign tumors is ordinarily sufficient, one variety of adenoma is more safely treated by amputation of the breast. It is the type in which papillomas push their way into the cysts and is usually met near the nipple in women close to menopause. It frequently gives rise to a discharge from the nipple, perhaps bloody in character, and has a distinct tendency to malignant change, probably 25 per cent. developing into carcinoma.

Benign true tumors are much less frequent than the rather poorly understood condition which has received many names—what many of us term chronic mastitis, others call subinvolution cysts, cystic disease of the breast, etc. There is a fibrosis with contraction of the connective tissue and a blocking of the ducts, so that many of the acini are dilated and form cysts which vary greatly in size, many microscopic, others 2 or 3 cm. in diameter. While the enlargement may be more prominent in one part of

the breast, the entire organ has a nodular feel and the other breast is usually affected to a greater or lesser degree. The cysts are very dense, for they are tightly distended with fluid and their consistency does not suggest a cyst. This condition is commonly met at the time the glandular tissue atrophies, and is replaced by fatty and fibrous tissue, hence, about the age of forty. The patient's attention is often directed to it by a sensation of pain, and in our experience pain, particularly during menstruation, is more frequent than in true tumors. The diagnosis is not always easy, for some of these enlargements closely resemble carcinoma in their consistency and their irregular and indefinite outlines. However, their failure to increase in size, the nodules in the rest of the breast, often in the other breast, and the absolute lack of fixation to the muscles, the skin, and the nipple should enable us to make an accurate diagnosis in the large majority. While probably a few of these cysts develop malignancy, there is no doubt that a combination of chronic mastitis and carcinoma is not rare, and such a cancer may be overlooked until undoubted signs of malignancy are present and reasonable prospects of a cure have passed. This fact must be borne in mind not only while reaching a diagnosis, but during an exploratory operation. Last winter we excised a widely diffused carcinoma of a breast from which a considerable section had been removed that showed under the microscope only cystic changes. The laboratory findings were probably correct, but the tumor had been overlooked at the first operation.

The selection of the proper method of treatment is often puzzling. If operation is not necessary the patient should be placed under careful observation over a considerable period of time. Even when the surgeon feels quite certain of the diagnosis, an exploratory incision may be indicated to relieve the extreme anxiety and fear that is so often present. As a matter of fact, many of these patients show more fear and desire for operation than do those with frank cancers. A thorough exploration can be carried out through an incision at the junction of the breast and the chest wall, and if advisable the offending portion of the gland removed with little scarring or deformity

but completeness of examination should never be curtailed in order to obtain a good cosmetic result. When the major portion of the breast is involved a simple amputation is best, otherwise pain may persist or some of the remaining cysts may enlarge. I believe that many women will consent to such an exploration who would refuse to undergo an amputation with its resulting deformity.

Diagnosis of cancer of the breast should not be difficult, or at least a tentative diagnosis should be easily reached. A tumor of the breast, which is single, more or less irregular, firm, and whose outlines are indistinct and fade imperceptibly into the surrounding tissue, is almost invariably malignant. At the first touch it may appear to stand out and be freely movable, but closer examination will show that it blends imperceptibly into the surrounding gland. If it is observed for some time, an increase in size, slow, perhaps, but persistent, can be noted. As Van Lennep used to teach us in this clinic, the old classic symptoms of retraction of the nipple, attachment to the skin, ulceration, fixation, enlarged axillary lymph-nodes, and cachexia do not call for the surgeon, but for the undertaker. Yet, the term "carcinoma" brings such a picture to the minds of many physicians even today, and these men advise no adequate treatment for what they consider to be innocent lumps in the breast.

When we review the results obtained in treatment of carcinoma we cannot help but be pessimistic. In spite of the newer methods that have been introduced, *x*-rays, fulguration, radium, etc., our successes are limited, and I fear they will continue to be so until some form of treatment is discovered that will act systemically and will arouse and help nature to overcome scattered areas of the disease. At present the best we can hope for is the destruction or removal of localized growths, no matter what procedure we use. We do accomplish a large percentage of cures when the disease can be removed before metastases have developed, but once the condition has invaded the lymphatics or blood-stream the outlook is next to hopeless. Hence our real chance of saving more lives rests almost entirely upon the institution of early diagnosis and energetic treatment. Much

blame is attached to patients for covering up tumors or for refusing operation, but careful surveys have shown that the medical profession is equally guilty and certainly more culpable, for every physician must know the danger that lurks in procrastination. It may be impossible to make an early diagnosis of cancer in such locations as the stomach, but surely this is not true of the breast. If patients who have been maltreated would hold the physicians personally responsible, the percentage of permanent cures would be much larger. To my mind operation is the method of choice in treating these cancers. The number of local recurrences is small, and it is seldom that a secondary growth appears in the scar of the wound. Radium and *x*-rays may destroy outlying islets, as in the lymph-nodes, but I cannot see how any damage can be done by a clean-cut removal of the primary focus.

When do tumors of the breast become inoperable? This is a hard question for the surgeon to decide. When secondary growths in distant parts can be demonstrated it is, of course, useless to remove the breast. Some of the most virulent metastases come from innocent appearing tumors. Yet sometimes the complete removal of an enormous, wicked looking cancer is followed by cure. Nature must have some power of resisting malignancy, weak though it is, and in some cases it seems to use this to prevent metastases even when it cannot hold the original growth in check.

Case I is a woman thirty years of age, whose family history is unimportant. She was recently delivered of a baby through a cesarean section on account of a contracted pelvis and a marked kyphosis from tuberculosis of the spine dating back to early childhood. She noticed a small lump in her right breast which she believes followed a pinch seven years ago. It has given her no bother and has remained unchanged in size or shape since she first discovered it. The rest of the breast is negative, but, as you can see, we find an oval body about 3 cm. in diameter, close to the periphery in the deeper portion of the gland. It is firm and smooth and, as you can also see, it slips or slides about

very freely. We have no difficulty in reaching a diagnosis of an adenoma, and would advise a simple enucleation except for one circumstance. This patient also had a small tumor on the dorsum of her right foot. It had been there for four years without disturbing her in any way. Six months ago it began to increase in size, and pressure of her shoe caused much annoyance and, finally, quite severe pain. The skin became pale, then slightly dusky, with the veins prominent, and several days ago this small tumor, originating in the deep fascia of the foot, was excised and proved to be a spindle-cell sarcoma. For that reason I do not feel that she should be subjected to a second operation, as we will have our hands full in trying to combat a lesion that could easily have been cured during the four years it was under observation and remained latent.

Case II is a woman forty-four years of age who has borne and nursed 4 children without any trouble in her breasts. The only point in her family or previous history that may interest us is that she had a large mole removed from her back fourteen years ago. Two years ago she noticed a lump in the upper outer quadrant of the right breast, which has since grown steadily. Pain developed after two months and a year later another lump developed above the clavicle. Gradually the entire breast was invaded, other swellings appeared in the axilla, and several months ago the right arm began to enlarge. She was treated by a "Pow-wow doctor" with incantations until a month ago. Then radium or Roentgen-ray treatment was instituted, which has apparently caused swelling, redness, and edema of the skin. A diagnosis can be readily made by a glance at this enormous, angry-looking tumor which occupies the entire breast, is fixed to muscles and skin, and extends upward to, and almost fills, the axilla. In addition, we have this large nodular mass above the axilla, and the right arm is edematous and almost twice the size of the left arm. We have then as virulent looking a cancer as we can conceive of. Yet this woman's general health is not correspondingly affected. She can get around quite well, and states that until two months ago she had

experienced no weakness. Careful examination, with the aid of the *x*-rays, has failed to disclose any secondary deposits, but, of course, operation is contraindicated.

Case III is a woman thirty-eight years of age who nursed her one child without difficulty. Her mother died of tuberculosis and one aunt died of cancer. She has been healthy, but has never been robust, and had a small tumor removed from the other breast a number of years ago. About a year ago she felt some pain in the left breast and shortly afterward noticed a small lump near the periphery. This increased slightly in size for several months, and about six months ago a second small nodule appeared about 3 cm. from the first. Several months ago the pain became quite annoying and now is present a large part of the time. Both breasts show small, nodular areas throughout, the right breast has a small linear scar near the nipple, and just beneath the skin and close to the periphery of the left breast are two fairly movable, tender nodules. These are quite dense, although the older gives a sense of fluctuation. We are justified in making a diagnosis of chronic mastitis, but the possibility of carcinoma must be considered, and, in addition, the chance of tuberculosis being the cause must be remembered. We have advised an excision of the tumors, and this will be carried out, but the patient insists upon a short delay.

CHOLELITHIASIS—CHRONIC PANCREATITIS

This patient, a man of forty-six, entered the hospital two weeks ago complaining of weakness, jaundice, and indigestion. One of his sisters died of cancer of the liver after having had gall-stones for some time and a brother has been under treatment for gall-stones. He had no illness until 1918, when he had a severe attack of influenza, and this was followed in six months by a nervous breakdown from which he recovered completely after having spent nine months in the open air. The first digestive symptom was an attack of severe pain in the right iliac fossa in 1920. Similar attacks developed and increased in frequency and severity, and he was operated upon for appendicitis two

years ago. Whether his gall-bladder was explored at that time we have been unable to find out. For a year after the

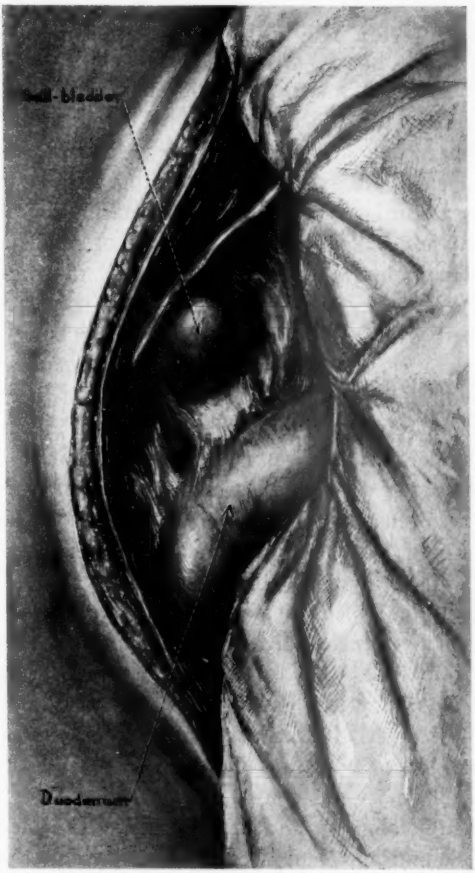

Fig. 80.—Chronically inflamed gall-bladder surrounded by firm adhesions which bind the duodenum so tightly against the liver that the inner half of the gall-bladder is flattened and distorted.

operation he had "stomach attacks," *i. e.*, sickening pain in the epigastrium followed by weakness and sleepiness. This would occur once or twice a month and last from two to eight

hours. His appetite was good and he ate whatever he desired without discomfort. These attacks ceased for several months, but seven months ago he was seized with a sudden, very severe, crampy pain under the right rib border that confined him to bed for two days. There was no nausea, vomiting, or constipation. A month later this pain again recurred, but was more violent and accompanied by vomiting and constipation. It lasted only a few hours, but was soon followed by jaundice and clay-colored stools which disappeared in a few days. Except for a burning sensation in the stomach after certain foods the patient felt well until the latter part of August. Then he developed pain in the lower abdomen and diarrhea, but this was soon followed by very severe pain in the epigastrium, which was relieved after a few hours by morphin. During the next week this pain recurred almost daily, without nausea, vomiting, or constipation, but with exquisite tenderness in the right hypochondrium and epigastrium. Jaundice then developed, stools were clay colored, there was moderate constipation with alternating attacks of diarrhea, but no more pain. Since then his appetite has been poor, there have been occasional eructations, but no acid risings, a loss of 22 pounds of weight, and general weakness. The principal points in the physical examination were the well-developed but not extreme jaundice and a moderate degree of tenderness a little to the right of and about 4 cm. above the umbilicus, and occasionally a similar tenderness at the tip of the ninth rib. The liver and spleen are not enlarged. There is no history of chills or fever and the temperature has been normal since the patient's admission to the hospital. The urine has shown a few hyaline and granular casts, bile, and once a trace of albumin and urobilinogen. The bleeding time has been one and a half minutes, coagulation time three to four minutes, icterus index 50, no leukocytosis, and only slight anemia. The van den Bergh test was positive for obstructive jaundice. The Roentgen rays show a deformity of the cap, adhesions between the liver, cap, and second part of the duodenum, and a thickening and mottling of the gall-bladder, which suggest cancer.

All the findings point to an obstructive jaundice, but it is difficult to make a much more exact diagnosis. The severe attacks of pain and the jaundice which cleared up quickly suggest common duct stone. However, there was complete absence of chill or fever, and the subsequent jaundice has persisted with little variation and pain has been absent. Stone in the common duct is the commonest cause of obstruction, but it is difficult to believe it has been the sole cause during the last two months. During this time obstruction from cancer has been strongly suggested, but the previous intermittent jaundice, the pain and tenderness, and a non-palpable gall-bladder point to an inflammatory cause. It is possible for an enlarged head of the pancreas to press upon the common duct, especially if the duct passes through it, and give rise to jaundice. As cholelithiasis is the commonest cause of pancreatitis, it is easily possible that pancreatitis may be the cause of the obstruction, either alone or combined with calculi. While it is not advisable to operate upon a jaundiced patient, our hands are forced, as this man is becoming worse and we have nothing else to offer him. It is well to be conservative, but to procrastinate and do nothing constructive is never wise. Calcium lactate has been given by mouth, but transfusion was not done, as the bleeding time has been normal.

Dr. C. N. Chipman, Washington, D. C., anesthetist: We have found that the effects of carbon dioxid and nitrous oxid on reduction of the coagulation time of the blood are notable. In most cases the coagulation time may thereby be reduced 50 per cent. In this particular case it may be difficult to get much result because the patient's coagulation time is already low—two and a half minutes. But if it were nine minutes, we could reduce it to four and a half. These gases also act as a good preliminary anesthetic in that they increase respiration, so that later, if ether is required, it will be inhaled more deeply. Furthermore, with this anesthetic it is rare that you have to restrain the patient.

Dr. Elliott: Although Dr. Chipman considered that it was improbable that we would get much reduction in coagulation

time in this case, he finds that it has been reduced to one minute.

We will now explore the abdomen through an upper rectus incision, and we find a moderately distended gall-bladder, with a thick, yellow wall, absolutely non-translucent, much fibrosed, and apparently containing much fat. It is surrounded by firm adhesions, which bind the duodenum so tightly against it as to cause a decided narrowing of the proximal half. As the Roentgen rays pointed out, these adhesions also extend to the under surface of the liver. The liver is darker in color than usual, but smooth, and about normal in size. The stomach is apparently normal. The head of the pancreas is very large, hard and moderately roughened, but not nodular. The induration extends throughout the pancreas, but the body and tail, while hard, do not feel much enlarged, and the superior surface is clean cut. The surrounding fat shows no areas of necrosis. There is undoubtedly a well-developed chronic pancreatitis. The gall-bladder contains a number of small calculi which we will remove. With these small, dark, mulberry calculi we are evacuating thick, dark bile. We will not attempt to expose the cystic or common ducts which are embedded in adhesions, but will content ourselves by palpating them. The foramen of Winslow is patent and no cause of obstruction of the common duct can be felt. A few slightly enlarged lymph-nodes can be palpated along the ducts.

The diagnosis is chronic pancreatitis and cholecystitis with stones, and the best treatment in this patient is drainage of the gall-bladder, which we will carry out with a dressed tube. This should give relief to the jaundice and allow nature to open the common duct if the enlarged pancreas is at fault. The removal of the gall-stones should take away the cause of the pancreatitis. If there is a stone blocked in the lower end of the common duct, an attempt to remove it at the present time would not be advisable, for a patient should be in the best possible condition before so formidable an operation is undertaken. Only necessary operative procedures should be carried out in a jaundiced patient, and for that reason we have been extremely careful and gentle during this operation, and have not torn or divided any

vessels except those in the small gall-bladder incision. We still fear hemorrhage in spite of the short bleeding time and the rapidity with which the divided vessels have thrombosed. I am greatly relieved that this patient did not have a cancer. His appearance, the loss of weight, and the absence of pain during the last two months were very suggestive of this lesion.

Laboratory Report.—The growth from the bile was a Gram-positive bacillus with diphtheroid morphology.

Postoperative Course.—A clamp was kept upon the drainage-tube for forty-eight hours, but little bile was discharged when it was removed. On the third day the patient became much more jaundiced. Persistent but not free oozing through and about the drainage-tube commenced on the fifth day and persisted, in spite of calcium chlorid, thromboplastin, and transfusion, without let up for six days. On the thirteenth day bile drained freely through the tube, the stools lost their clay color, and all oozing stopped. During this peroid the patient had become weaker and moderately anemic, the hemoglobin having fallen to 60 and the erythrocytes to 2,900,000. The bleeding time increased to three minutes and coagulation time to five and a half minutes. After the thirteenth day convalescence was continuous, and the patient was discharged on December 17th in good condition and without jaundice. On February 3d patient reported that he was feeling splendidly, had reached his normal weight, had no indigestion, and had not been jaundiced.

VARICOSE VEINS

Dr. Chipman will again attempt to decrease the coagulation time with carbon dioxid and nitrous oxid anesthesia. It was three and a half minutes when the anesthesia was commenced, and is now one and a half minutes.

This patient is a male, aged forty-one, who complains of pain in the left leg. He is a tailor and sat much of the time with his legs crossed until ten years ago. Since then he has been on his feet a great deal. He denies any injury of his feet or legs, and has never been confined to bed by illness, otherwise his family and past personal history have nothing of interest to us. About

five years ago he noticed a very decided swelling on the calf of his left leg, but none on the inner side or on the other leg. At that time he was told he had varicose veins, but they gave rise to no subjective symptoms, only bothering him by their appearance. During the last year he suffered a great deal with itching and a sense of weight and cramps in the leg, the last particularly in the calf muscles. A peculiarity about these cramps is that they are only noticeable when his leg is at rest, and he keeps moving his foot to obtain relief. Examination of his heart showed no abnormality, and we could find nothing in the abdomen that would cause pressure upon the veins and interfere with the return circulation. He has well-marked bilateral flat-foot and the cramps and weakness of his left leg might easily be due to this condition, but working upon his feet causes him no bother whatever. The long saphenous veins show very slight dilatation or thickening, certainly not more than is usually met in a man of his age. The calf of the right leg is negative to inspection, but on the back of the left leg we find a mass of intertwining, twisted, tortuous cords just beneath the skin, which we readily recognize from their bluish color and soft consistency to be varicose veins. Pressure easily empties them, but they quickly fill again, and the distention is much greater when we lower the end of the table and place the limb in a dependent position.

Varicose veins are common, even such greatly fibrosed, thickened, and dilated veins as these are not unusual, but it is extremely rare to see only branches of the short saphenous vein affected. The usual causes of interference with venous flow of the lower limbs, such as an occupation requiring erect posture, weakened heart action, pregnancy or abdominal tumors, or even thrombosis after acute phlebitis, almost always involve the long saphenous in the thigh, then its branches in the leg, and finally, if at all, the short saphenous. A number of operations have been devised to destroy varicose veins since Trendelenburg first suggested and practised ligating the long saphenous just below its entrance into the femoral vein. While this method is constantly used and is quite successful so far as the thigh is concerned, it will not cure the varicosities in the leg. It is easy

to remove this vessel from the knee to the saphenous opening by one of the stripping methods, and that is our usual practice. We have tried the Schede method of ligating all of the veins

Fig. 81.—Varicosity of external saphenous vein.

in the superficial fascia by circumcising the leg below the knee down to the deep fascia. It has been very successful, but, unfortunately, it also seriously interferes with the lymph flow,

and sometimes a dense edematous swelling of the leg and foot follows and seriously cripples the patient. The best method appears to us to be multiple ligations and excisions of the offending veins, and this is the procedure we are now carrying out. As you can see, these veins are very superficial, many of them so intimately attached to the skin that they cannot be separated from it. Also, you will notice that the veins are much thicker and harder than normal, for a varicose vein is more than a dilated vein, its walls are fibrosed from chronic inflammation and have lost their elasticity and power of contraction. The leaflets of the valves become contracted and shortened and cannot close completely, so that the weight of the column of blood from the foot to the heart rests upon and stretches the walls. We have now removed nearly all of the branches of the short saphenous on the dorsum of the leg, but will not touch the long saphenous, as it does not show any involvement.

Postoperative Course.—The patient was confined to bed for three weeks and then used a supporting bandage for several weeks. The wounds healed without incident, and on January 15th there were no enlarged veins in the leg, no edema or swelling of foot or ankle, and the patient had been doing his usual work without discomfort.

CLINIC OF DR. EDWARD J. KLOPP

JEFFERSON HOSPITAL

TRANSVERSE FRACTURE OF PATELLA

THE patient is a woman fifty-six years of age. Five days ago she slipped; while regaining her balance something seemed to snap in her right knee. On admission to the hospital she presented a transverse fracture of the patella, with 1-inch separation. A posterior splint was applied and an ice-bag was placed over the knee. The following day the *x*-ray showed ½-inch separation.

As we examine the patient today she appears approximately ten years older than her years indicate; she is slightly undernourished, but there is nothing in her general condition to contraindicate an operation. We are using nitrous oxid-oxygen-ether anesthesia. The knee is slightly swollen and discolored. You can see the separation of the fragments. We can easily push the fragments together.

Operation is recommended because conservative treatment often does not accomplish good results. Tags of torn fascia and periosteum become impaled on the spiculæ of the fragment, usually the upper. This may be an important factor in nonunion. Resumption of activities will be earlier than by the conservative treatment.

The time to operate is governed chiefly by two conditions—swelling and fever. As a rule the best time to operate is during the second week after injury. Lane operates immediately.

This patient has a normal temperature and pulse-rate, there is but moderate swelling. We think there is no danger operating now, constitutionally or locally, five days following the injury.

The choice of operation depends upon the individual surgeon. The method of subcutaneous fixation of the fragments is obso-

lete. I have not seen it used. An absorbable suture material is most desirable in cases of recent fracture. We will use chromicized catgut. Silver wire or aluminum bronze wire may be used in cases of long standing. Bone-grafts have given splendid results.

The incision may be vertical, transverse, or U shaped. The vertical incision would suffice here, but the U-shaped incision will give us better exposure and permit you to see clearly the steps of the operation. The soft parts are reflected upward, well above the upper border of the patella. We remove the clots with tissue forceps and gauze. The fascia and periosteum are torn irregularly, a flap falls over the fractured surface of the upper fragment; it is trimmed off. Hemostasis must be absolute. There are four bleeding points which we will ligate. The finger does not touch the wound. With a straight needle we will pass a suture transversely through the patellar ligament close to the patella, then in the opposite direction through the quadriceps tendon. As we tie this suture the fragments come in good apposition. The capsular ligament is closed on each side with interrupted sutures. The torn fascia and periosteum over the patella are also closed with interrupted sutures. The skin is closed with silkworm-gut, without drainage.

The postoperative treatment consists in the application of a posterior straight splint for two weeks. After its removal the leg will rest on a pillow for another week. During the fourth week the patient will be instructed to make attempts to actively bend the knee. When the leg comes to a right angle with the thigh, about the sixth week, she gets out of bed and soon begins to walk with the aid of crutches. Passive motion should not be made within six weeks; massage may be desirable.

Operation for fracture of the patella does not always give better results than the conservative treatment. Eight years ago a woman aged thirty years was admitted to the ward three weeks following the injury. The capsular ligament, fascia, and periosteum were sutured with catgut. A cast was applied two weeks later and the patient was sent home at her request. A year later she fractured the other patella. She was four months

pregnant. She refused to leave her home. The fracture was treated conservatively on a posterior straight splint. Prior to this accident she walked with a decided limp and was unable to flex her leg more than 45 or 50 degrees. This poor result probably was due to the wearing of the cast for five weeks. Her physician reported a better result, although not entirely satisfactory, of the last fracture. We wish to emphasize that early removal of the splint and active motion in the cases operated upon will give good functional results.

CARCINOMA OF THE LOWER JAW

A laborer, fifty-five years of age, entered the hospital eight days ago complaining of pain in the right side of his face, earache, and ulcers of the mouth. No knowledge of malignant disease in the family; no previous operations. Has tonsillitis frequently, moderately productive cough, and occasionally night-sweats. Smokes cigars and pipe.

While having teeth removed by a dentist in March, 1925 he was told that he had a growth in the right side of the lower jaw. At that time there was no pain or swelling. He consulted a physician, who paid little attention to it. In June he went to another physician, who referred him to a radiologist. His treatments with *x*-ray above and below the lower right jaw were begun June 24, 1925. The dose given was 5 mm. twenty minutes, anode target distance 12 inches from skin, gap 9 inches, filters 6 mm. of aluminum and glass. He received seven applications between June 24th and September 15th. Radium was applied between June 25th and August 24th, using 50 mg. of radium element inside the mouth for a total of ten hours. The dosage was from one to one and a half hours each. Intense pain followed irradiation, which was relieved in a measure by ice-bags.

When admitted to the hospital there was marked swelling and redness of the right side of his face, with edema of the eyelids. Many teeth were missing; the remaining teeth were in bad condition. He wore two bridges. His mouth was very foul. We referred him for dental care. The bridges and all but two

teeth were removed. I am sorry that this was not done before irradiation was begun in June.

The urine and Wassermann are negative. The blood-count shows hemoglobin 76 per cent.; red blood-cells, 3,980,000; white blood-cells, 6200; polynuclears, 84 per cent.; small mononuclears, 10 per cent.; large mononuclears, 2 per cent.; eosinophils, 4 per cent. He has not lost much weight.

The swelling and pain have subsided considerably. The skin is red, feels hot to the touch, and seems fixed to the lower jaw.

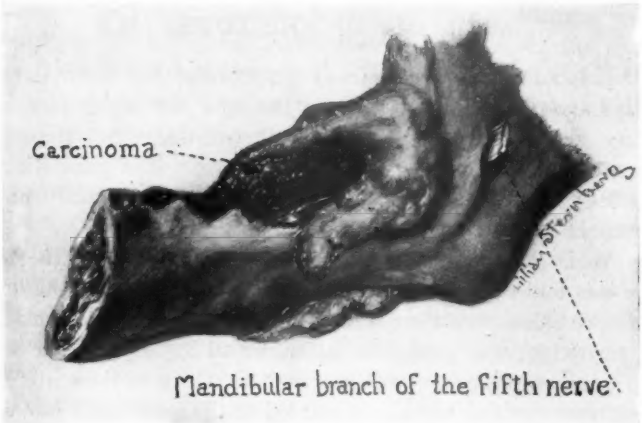

Fig. 82.—Showing the approximate extent of carcinomatous invasion of the mandible and mucous membrane.

There are no glands palpable in the neck. He cannot open his mouth sufficiently for us to see the extent of the malignant ulcer of the mucous membrane which begins opposite the frenum and back well toward the ramus. The tongue is slightly swollen, but not involved. The upper border of the alveolus is rough for a distance of 1½ inches. On palpation one gets the impression that the ulcer involves the mucous membrane along the ramus. The discharge is fetid and frequently contains streaks of blood.

We appreciate the fact that surgery for carcinoma of the mouth is very unsatisfactory. Removal of the tongue by knife

excision is attended by a high mortality, immediate or remote. The stump becomes septic, which may cause secondary hemorrhage or aspiration pneumonia. Recurrences are numerous. Carcinoma of the floor of the mouth likewise is very often followed by recurrence. Carcinoma of the lower jaw with limited involvement of the soft parts frequently can be dealt with satisfactorily by excision in conjunction with *x*-ray or radium, or both. It is a good plan to consult with the radiologist and pathologist before deciding on a plan of treatment.

Inasmuch as the man has had *x*-ray and radium without benefit, but a great deal of discomfort (at the time of operation we had no information regarding the dosage—he probably should have had more), we have decided to operate.

The patient has been anesthetized. We will continue with intratracheal anesthesia, using the Elsberg apparatus. Dr. Clerf, of the Bronchoscopic Department, will introduce the catheter for us. It is a great comfort to have one so skilled to insert the catheter. We know it is going to be done carefully, quickly, and inserted into the trachea and not the esophagus.

Operation.—We pass a large silk suture through the tip of the tongue to pull it forward and toward the opposite side. A vertical incision is made in the midline of the chin beginning ½ inch below the vermilion border of the lip, extending below the jaw, then backward to the angle. We continue up along the posterior border of the ramus, as we probably may remove a portion or all of it. The soft structures are divided and the facial artery ligated and severed. The skin is adherent to the jaw for an inch or more. This may be due to the previous treatment or carcinomatous invasion. Not being certain, I will leave the attached skin by making a curved incision above it, connecting it with the primary incision. The remainder of the soft parts are now removed from the outer side of the bone. The soft parts are separated near the symphysis and with a Gigli saw the bone is divided. The right body is now grasped with a pair of sequestrum forceps and pulled downward and outward. The muscles are divided, this exposes the mucous membrane of the mouth, which is divided close to the tongue.

The separation of the attachments of the temporal muscle to the coronoid process is time consuming; we will cut through it with a bone forceps. The parotid gland and masseter muscle have been removed by blunt dissection. The specimen will be passed for your examination. There has been very little bleeding. Few ligatures are needed.

There is no trouble to suture the mucous membrane of the cheek to that of the mouth. The skin is closed with two drains.

The patient will have a cup of liquor antisepticus alkalinus at his bedside so that he may wash his mouth frequently. He will be referred to the *x*-Ray Department for postoperative treatment.

DUODENAL ULCER WITH NON-ROTATION OF THE COLON. DIAGNOSED CLINICALLY AS GALL-BLADDER DISEASE

Just as we are about to make the incision we receive a message from the *x*-ray laboratory that the gall-bladder is normal according to the dye test. A gastro-intestinal study was not made in the hospital. We were told that this had been done before he entered the institution and found to be negative. Last night we learned that this was an error; there has been no *x*-ray of the gastro-intestinal tract.

The patient is an Italian laborer, forty-eight years of age, complaining of recurrent attacks of pain in the upper right quadrant and back. The history as obtained by the intern is as follows:

Family History.—No similar condition in family. Measles and mumps in childhood. Repair of left inguinal hernia ten years ago. Lipoma removed from leg a number of years ago. No serious injuries. Typhoid-pneumonia(?) some years ago. Denies venereal infection. Teeth fair. Appetite good. Bowels constipated.

Present Illness.—Two years ago he had an attack of upper right abdominal pain which lasted one day. It came on at night. He thought nothing particular about it at the time, and blamed it upon his stomach, as he vomited violently at the time.

From then until this summer (June) he has had no pain, but has had vague discomfort at times.

In June he began to have upper right abdominal pain, which most always radiated to the back. These attacks come on most every night. They always come on at night. There have been about seven real colic-like pains, but there has been some pain

Fig. 83.—Colon injection showing non-rotation of the colon.

every night. He has been able to work most of the time, for he feels pretty well during the day. Has lost but little weight. His best weight was 146 pounds, he now weighs 134 pounds. Recently his appetite has been very poor. He would eat well for two days and then be upset for three days.

Examination of the abdomen is negative except for slight tenderness in the gall-bladder area.

Operation.—Through a right rectus incision of ample length we explore the upper abdomen. The liver comes into view; it appears to be normal. The gall-bladder pops up readily; it is free and is of normal color. On palpation it seems normal and does not contain stones. The ducts are normal to palpation. This demonstrates the value of cholecystography. Let us hear

Fig. 84.—Showing function of new stoma five weeks following anterior gastro-enterostomy.

the *x*-ray report which has just been brought in: He was given sodium tetrabromphenolphthalein. The gall-bladder takes up the dye at practically normal rate. It is normal in size, shape, and position. It also evidently contracts after a meal. According to this the gall-bladder is not diseased (Manges).

Cholecystography has been a big help in diagnosing upper abdominal disease. We have found it accurate in the cases that

came to operation. It may avoid needless surgery. On the other hand, one may be misled by positive findings. Normal gall-bladders should not be removed, even though the patient complains of symptoms which are supposed to be due to a diseased gall-bladder regardless of what the cystography shows.

The duodenum is unusually mobile. In the first portion on the posterior wall is a large ulcer adherent to the pancreas. The induration extends well forward over the anterior wall. The structures are lifted easily into the wound. All of you can see the scar. It extends to the stomach side of the sphincter. Stippling is beautifully demonstrated, which is one of the differentiating points between ulcer and carcinoma.

In many clinics, European and American, pylorectomy or partial gastrectomy has been favored as the best operation for duodenal ulcer. Simple excision of the ulcer, as done by Horsley, of Richmond, and others, has many advocates. In this clinic gastro-enterostomy is done in the great majority of cases. Our results have been satisfactory in at least 90 per cent. of the cases. We see no reason to change. The results must be based upon the patient's symptoms and not on certain laboratory findings. These often are erroneous. Gastro-enterostomy will not relieve symptoms which have not been due to an ulcer; neither will it cure gall-stones or cirrhosis of the liver.

The stomach is larger than the average. We will endeavor to perform a posterior gastro-enterostomy. The transverse colon is difficult to bring up; it seems to form a sharp angle. There is something abnormal about its arrangement. There are two methods for finding the first portion of the jejunum: by pulling on the transverse colon toward the right shoulder the jejunum usually comes into view, or by passing the index-finger on one side and the thumb on the other of the spine, astride if you choose, the bowel picked up is the jejunum. It must be definitely recognized as such by the ligament of Treitz. I fail to find the jejunum. On thorough exploration it is evident that there has been a failure of rotation of the colon. All of the colon is on the left side of the abdomen; the small intestine occupies the right. Now I know where to search for the jejunum. Pos-

terior gastro-enterostomy is out of the question, and we will, therefore, have to do the anterior. The serous surfaces are united with vaselinized linen. We do not remove or excise any of the mucous membrane. The redundant intestinal mucosa is utilized to cover the raw surfaces. We believe that its preserva-

Fig. 85.—Showing function of new stoma five weeks following anterior gastro-enterostomy.

tion is a factor in preventing marginal ulcers. Chromic catgut is used in the mucous membrane suture.

The appendix shows evidence of pathology; we will remove it. We do not remove the appendix routinely in all cases of upper abdominal disease. It is hard to conceive that an obliterated appendix does much harm to the upper abdominal organs.

We believe that all cases of ulcer operated upon should continue under the careful supervision of a medical man. Restricted diet for six or twelve months after operation is just as important as in many cases six to twelve years before operation.

***x*-Ray.**—The *x*-ray examination of the gastro-intestinal tract five weeks after anterior gastro-enterostomy shows the following:

Barium enters the stomach normally, and it first passes rather rapidly through the gastro-enterostomy opening considerably nearer the pylorus than usual, and evidently at the anterior inferior wall of the stomach. Only very small quantities of barium, if any, passed through the pylorus. There was at times quite vigorous gastric peristalsis. We believe that this was present before the operation as result of the duodenal ulcer, and that it does not indicate obstruction of both the pylorus and enterostomy opening. In short, I think this hyperistalsis will gradually disappear. There is no indication of organic lesion of the stomach or of the small intestines.

At twenty-four hours it was evident that all of the colon was in the left half of the abdomen. This was later confirmed by means of a barium enema, which shows that there is entire absence of rotation of the colon or complete non-rotation (Manges).

MULTIPLE STONES IN THE LEFT KIDNEY

The patient is a short and very obese woman, thirty-eight years of age. She always has lived in Philadelphia. She complains of intermittent attacks of colicky pain in the left loin radiating to the bladder and vagina. The first attack occurred five years ago. They came on at about three-week intervals and lasted twenty-four hours. For a long time they usually preceded a menstrual period. Several times she passed small stones and sand. There has been no macroscopic blood. No nocturia; frequency when active.

Nothing unusual in the family or previous personal history. Three full-term pregnancies with difficult deliveries. Had a suppurating gland of the neck drained at twelve years of age.

Blood Examination.—Hemoglobin, 82 per cent.; red blood-cells, 4850; white blood-cells, 9800.

Non-protein nitrogen, 41 mg. Urea, 14.77 mg. Creatinin, 1.2 mg.

Wassermann negative.

Urine: Specific gravity 1018, alkaline. No red blood-cells. Hundreds of pus-cells, triple phosphate. No casts.

***x*-Ray Report.**—There are several large calcareous masses which fall within the kidney shadow on the left side. They seem to occupy the kidney pelvis and calices, and apparently the entire organ is involved. There is no evidence of stone in any other part of the urinary tract (Dr. Farrell).

Cystoscopic Examination.—Much free pus floating about the bladder. Both ureteral orifices are prominent, slightly infiltrated, and edematous; the right one is perhaps more nearly normal than the left.

Indigocarmin returned from the left in five minutes good color, poor force to jet; returned from right in six minutes good color, better force to jet (Dr. Lownes).

Operation.—The space between the ribs and the ilium is small. She is very fat. A rolled blanket placed over the raised gall-bladder or kidney stage on the table increases the space slightly. We make the Mayo incision. It must be long enough to easily admit the hand to free and deliver the adherent and moderately enlarged kidney. The adhesions in this case are about as one would expect to find. We will not attempt to deliver the kidney until the adhesions have been separated. One can hardly resist the temptation to make an effort to deliver the kidney before it has been thoroughly liberated. Experience proves that this is unwise. "We should not attempt to do the operation before we come to it." Occasionally it becomes necessary to remove stones from a kidney that has not or cannot be delivered. Hemorrhage under these conditions may be most distressing.

The kidney is well up in the wound. It is irregularly enlarged, the irregularity being due to the size of the stones. The dilated pelvis is nearly filled by a large stone which is

removed by making a free incision through the posterior wall. The stone is soft, rough, and irregular. All of the remaining stones cannot be palpated through the pelvis. We will make an incision longitudinally through the cortex. The stones are carefully removed so as not to tear the kidney substance. There is not much bleeding. The incision in the cortex will be closed by mattress-sutures which are tied over a bundle of eight or ten strands of plain catgut. This will prevent the sutures from

Fig. 86.—*x*-Ray showing multiple stones in the pelvis and calices of the left kidney. The right kidney and ureter are negative.

cutting through the friable kidney substance. Very often it is unnecessary to suture the opening in the pelvis. Owing to the size of the opening in this case we will insert one suture in the fat over the pelvis. There is no bleeding. A rubber-covered gauze drain is carried down to the pelvis. It will be removed in seventy-two hours. We should save the kidney whenever possible when operating for stone. When a patient has demonstrated his or her ability to form stones in one, the possibility of stone formation in the other kidney must be kept in mind.

On two occasions I have been obliged to remove the kidney for uncontrollable hemorrhage while operating for stone. My first nephrectomy was done for hemorrhage six days after the operation for stones. In this case the stones were removed through a cortical incision. He had stones in both kidneys; only the right was operated upon. He was alive seven years later and in moderately good health.

Postoperative Notes.—For twenty-four hours the urine contained macroscopic blood. Convalescence was satisfactory in every manner. Two months later patient had pain in the left side and passed a little sand.

x-Ray examination following this attack showed no evidence of stone.

INTRA-ABDOMINAL ABSCESS

The patient is a Greek restauranteur, twenty-nine years of age. He was admitted eleven days ago complaining of pain in the upper left quadrant of the abdomen. The temperature was 102° F.; pulse, 120; leukocytes, 6150; polymorphonuclears, 80 per cent. The urine was negative and found negative at every subsequent examination.

His pain began three days before admission in this region. No previous attacks of abdominal pain. The pain at times radiates to the left kidney region.

Two days after admission the leukocytes increased to 12,000. The abdomen became markedly distended. There has been hiccuping and vomiting. Tenderness gradually shifted downward on the left side opposite the umbilicus. Rectal examination was negative at all times. For two days there was sharp pain in the left lower chest. *x*-Ray showed both sides of the diaphragm elevated, but they moved equally and freely with respiration. A flat *x*-ray of the abdomen taken six days ago reported as follows:

There is no evidence of stone in the urinary tract. There is quite an extensive amount of gas in the intestines, especially the colon. It is rather strongly suggestive of the presence of

infection in some portion of the abdomen, and from the appearance of the radiograph it is probable that it is in the left side of the abdomen, about the level of the iliac crest (Manges).

Yesterday he had a chill. Today we can palpate an indefinite, tender mass in the left side of the abdomen, corresponding to what would be a large appendical abscess if it were on the right. There is no tenderness over the left kidney. The man is young for a perforated acquired diverticulitis of the sigmoid. In these cases one can palpate a mass per rectum. We make a diagnosis of intra-abdominal abscess, probably appendical.

Operation.—Through a left Kammerer incision we open directly into a large abscess; the odor is foul and pungent. In exploring with the finger we cannot determine the source of the abscess. One has a strong desire to go on exploring until the cause can be established. This would be unjustifiable. We insert two large rubber-covered gauze drains. When the patient has fully recovered we will suggest that a gastro-intestinal study be made. We hope to determine the cause of the abscess.

The patient was discharged from the hospital one month after operation with the wound practically closed.

CLINIC OF DRS. B. A. THOMAS, J. C. BIRDSALL, AND F. G. HARRISON

GRADUATE SCHOOL OF MEDICINE OF THE UNIVERSITY OF PENNSYLVANIA (POLYCLINIC HOSPITAL)

HYPERTROPHY OF PROSTATE

THE first patient this afternoon is a man seventy-two years of age who was admitted to this hospital a few days ago with acute retention of urine due to an hypertrophied prostrate. It is our custom, if possible, to drain such patients by catheter, getting them into what we consider an operable state before attempting any surgery. In other words, routinely to do the one-stage operation when it is possible. Certain conditions, however, constituting in our experience about 10 per cent. of all cases, make it necessary for us to resort to the two-stage operation, which we are about to undertake this afternoon. This patient does not tolerate his catheter very well; there is a very marked cystitis, with the production of much pus; he is very toxic and, besides, he is suffering from senile dementia and pulls his catheter continually. His blood-pressure is 220 systolic and 135 diastolic. Phenolsulphonephthalein given intravenously did not appear for forty-three minutes, and then only in slight traces. The blood urea nitrogen is 65 mgm. per 100 c.c. In other words, this patient, in our opinion, is a very poor operative risk, and in an attempt to give him better drainage, his only hope for recovery, we are about to do a suprapubic cystotomy under local anesthesia by the suprapubic regional block method. Novocain, 1.0 and 0.5 per cent., are used and a vertical suprapubic incision made, and the bladder opened. The prostrate is found to be abnormally enlarged and there are no complicating stones or diverticula. A large drainage-tube is introduced into

and brought out of the upper angle of the bladder wound and sutured to the lower angle of the skin wound and the wound closed on tiers. The after-treatment of this patient will be proctoclysis, employing half-strength saline solution and stimulation to the heart by small doses of digitalis and caffein sodiobenzoate for the kidneys in an attempt to encourage diuresis and get him into an operable condition, so that the secondary operation of prostatectomy may be performed.

GRANULOMA INGUINALE

The second case is one of granuloma inguinale which has been practically cured by ascending dosage of tartar emetic, beginning with 10 c.c. of a 0.1 per cent. solution and carried to a maximum final dose of 20 c.c. of a 1 per cent. We will also show slides on the screen of 5 other cases before and after treatment by the tartar emetic therapy. This disease, at one time supposed to be confined to the tropics, is now known to be endemic in many localities, and to afflict individuals who have never been in the tropics. Both sexes are affected and the colored race is chiefly involved, although whites are occasionally affected.

SEMINAL VESICULITIS

The third case is one of vasopuncture and medication for seminal vesiculitis. This patient; a man aged thirty-four, has been suffering from an arthritis, due, we believe, to absorption of infection from the seminal vesicles. While in the army he had a bilateral operation at the Walter Reed Hospital, the exact nature of which we are unable to determine, but from the description given by the patient we believe that it was a vasostomy and that medication was carried out on several successive days. At present he apparently is getting some absorption from his seminal vesicles which are palpable, and examination of the prostate reveals that it is practically normal. We will attempt to demonstrate two technical methods upon this patient—viz.,

on the right side the so-called "one-man" operation, and on the other side the "two-man" technic, *i. e.*, where the vas is held by an assistant. Local anesthesia is used and the superficial structures overlying the vas are injected for about 1 to 1½ inches. The vas is isolated from the cord and held taut by the assistant. An incision is made approximately 1 inch long directly over the vas, through the skin and superficial tissues. In this operation it is desirable to have an experienced assistant who can hold the vas so that it may be easily delivered through the incision. The vas is delivered and stripped of its coats and held tense by the insertion of the handle of the scalpel beneath it. It is punctured with a sharp pointed needle and 3 to 5 c.c. of a 5 per cent. solution of collargol are injected. It is an easy matter to be sure that the needle is within the lumen of the vas, as a small black streak may be seen springing up through its lumen from the needle, and the contents of the syringe may be injected without appreciable back pressure.

As the needle is withdrawn compression is made over the site of the puncture and a small Lembert suture of 00 plain catgut is introduced through the external coat of the vas, midway of the oblique needle puncture, and tied, to prevent back leakage. The vas is then ready for replacement, and it is an important thing to be sure that it is placed normally within the scrotum in the same position as before the operation, as we believe that most strictures are due not to the introduction of the antiseptic solution, but more likely to the common practice in vasotomy of a bistoury incision to facilitate the introduction of a blunt needle or maintenance of the "ostomy" for repeated medication, together with the angle in which the vas is usually left after such an operation.

On the other side we will attempt the "one-man" operation. The introduction of the anesthetic is the same, except the structures about the external ring are injected upward, inward, and downward by the anesthetic solution, after which we isolate the vas from the other structures of the cord by pushing it forward with underlying index-finger and encircle it through the skin with Backhaus towel clips. The incision is then made and the vas

delivered and the same operation carried out as done on the other side, thus showing that such an operation can be carried out without the help of an assistant, although it is more desirable to have one.

CARCINOMA OF THE BLADDER

The fourth case is a man forty-nine years of age, who was admitted to the hospital a few days ago with a chief complaint of pain in the left side. The patient stated he was well until July of 1925, when he developed a sharp shooting pain in the left lumbar region which radiated toward the pubis. He went to bed under the care of his family physician for one month, at which time the family physician thought he had a renal calculus. On August 1st, while he was still in bed, he developed frequency and burning on micturition; with nocturia ten or twelve times. There has been progressive loss of weight. The pain in the left side has all cleared up and the main thing at present is his frequency and burning on micturition. About two weeks ago there was hematuria.

One sister died of carcinoma of the breast. His previous medical history is negative.

Physical examination reveals a man, apparently fifty years of age, who while not actually ill bears the marks of some illness and loss of weight. The physical examination is negative except there is a slight tenderness and pain on fist percussion over the left kidney. *x*-Ray of the genito-urinary tract is negative. Wassermann is negative and the blood-count shows a mild anemia. Blood chemical examinations are negative. Cystoscopy reveals a papillary carcinoma of the bladder involving the base and the vesical orifice. As the carcinoma in this case was so situated as to exclude any thought of partial cystectomy, it was advised (as it was thought to be an early case), that a bilateral synchronous ureteral transplantation be performed followed by a total cystectomy a few weeks later, as has been recently recommended by Coffey. The patient has had one deep *x*-ray cross-fire treatment prior to this operation.

Under ether anesthesia a median incision is made and the peritoneal cavity opened. The right ureter is identified, isolated, ligated, and severed about 3 inches above the bladder; the left uterer is found to be the seat of marked adhesions. It is quite enlarged and hard, and when cut carcinomatous tissue exudes from the bladder segment; involvement has extended up the ureter for about 4 inches. Moreover, a lymph-node 1½ inches in diameter is palpated on the left pelvic wall.

We realize that such conditions render hopeless any thought of radical cure in this patient, but having already transplanted the right uterer, we will proceed with the operation and transplant the left one, also in accordance with the latest advices and technic of the Coffey method.

UROLOGIC CLINIC

Presbyterian Hospital

The first thing on the program this afternoon before we proceed to the operating room is the demonstration of a modern Urologic Clinic, as seen in the new Out-patient Department of the Presbyterian Hospital. This will include the routine work in the examination of patients, including cystoscopy, diathermy, other electrical modalities, the irrigating room, the treatment rooms, and the room where salvarsan is given, in which adjoining booths are provided for patients to disrobe, etc.

A discussion of the etiology, determination of operable and inoperable types of bladder diverticula with demonstration of patients, and lantern slides depicting their pathology, will be conducted in one of the rooms for those who are not particularly interested in watching the routine work of the Dispensary.

RENAL CALCULUS

The first patient to be operated this afternoon is a man thirty-eight years of age, whose chief complaint is pain in the right side, which began in 1924. The attacks are sharp at times. There is no radiation and no nausea or vomiting. The last attack was the

worst, and the pain radiated to the right testicle. The patient states that he had hematuria for one day in 1923, which cleared up promptly and has not reappeared.

Physical examination is negative except for slight tenderness to first percussion over the left kidney. *x*-Ray reveals a large branching calculus of the left kidney. Cystoscopy shows a

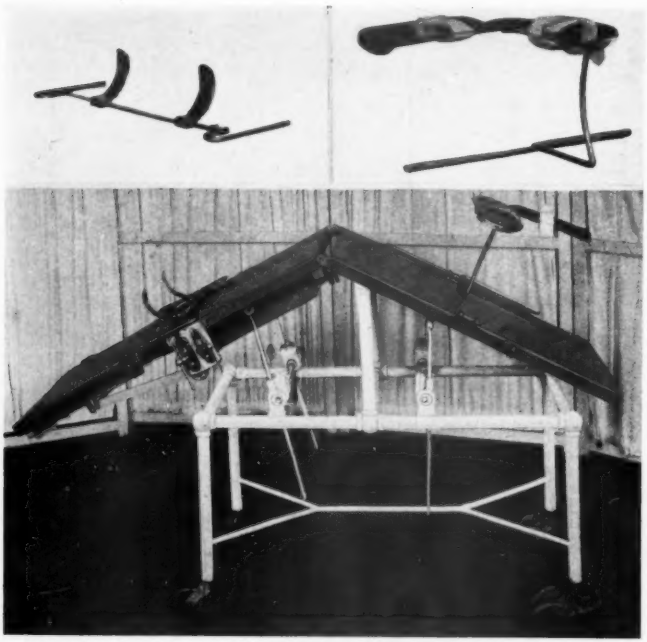

Fig. 87.—Operating table flexed for kidney surgery, showing adjustable arm and leg supports in position. Inserts in upper corners show supports detached and attachable to any table.

normal bladder and that both kidneys are functionally sufficient when indigocarmin is given intravenously. The catheterized urine from both kidneys reveals normal urine from the right side, and 25 to 30 pus-cells per high-power field on the left side. The blood urea nitrogen is 11 mgm. per 100 c.c.

This we believe to be a case of renal calculus with a so-called crossed renal reflex or renorenal reflex. In other words, the patient has a stone on one side and all his subjective symptoms are on the other. His attacks of pain have all been on the right side and the *x*-ray clearly demonstrates a large calculus of the left kidney, but no evidence of stone or other disease of the right kidney. We shall proceed to explore the left kidney with a view to nephrectomy.

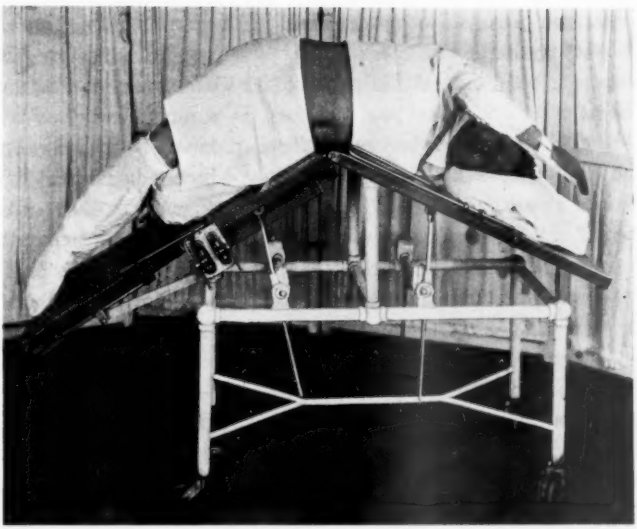

Fig. 88.—Patient in position for kidney operation: Under arm extended behind patient; upper arm elevated on and secured to support allowing free respiration; lower leg flexed at right angle and secured to adjustable support with thigh anterior to extended upper leg.

You will notice the position of the patient maintained by our recently devised arm-rest and leg support. The arm-rest is designed so as to keep the arm in position and allow free breathing by the patient; the leg-support prevents the flexed thigh from dropping and keeps the patient on his side in a mid-position. These supports are made by the Harvey R. Peirce Company of Philadelphia (Figs. 87, 88). Under ether anes-

thesia the usual curved kidney incision is made and the kidney delivered and the large calculus is definitely palpated. As this calculus is too large to permit its delivery through an incision in the pelvis, and in the belief that should a nephrectomy be done and the large branched stone removed through the cortex, there might result serious trouble from bleeding, and sooner or later, probably, a return of lithiasis, as there is already evidence of a chronic pyelonephritis, necessitating the removal of the kidney under unfavorable circumstances, nephrectomy will be done. Indigocarmin has shown the right kidney to be functionally sufficient and able to care for the entire renal function. No drainage is required in this case and the wound will be sutured in tiers.

The kidney, when sectioned from pole to pole, reveals a large branching calculus approximately 4 inches in length, with multiple small calculi studding the calices, even in the cortex. Thus it would obviously have been impossible to remove all the stones by a nephrolithotomy, had it been attempted. Therefore, the nephrectomy seems to have been justified.

HYPERTROPHY OF PROSTATE

The second case is a patient aged sixty-four, who developed acute retention of urine ten days ago, with the history that in February, 1925 he began to notice difficulty on micturition accompanied by dysuria and nocturia three or four times. Rectal palpation reveals a prostate enlarged to what we term the second degree, smooth and symmetric in outline, and the base just palpable to the examining finger with no evidence of malignancy. Cystoscopy reveals a uniform enlargement of the gland with some preponderance of the median lobe. Blood-pressure 155 systolic and 100 diastolic. Blood urea nitrogen 13 mgm. per 100 c.c. Phenolsulphonephthalein given intravenously appeared in four and a half minutes. In the first twenty-minute period of elimination there was 30 per cent., in the second, 20 per cent., and in the third, 15 per cent., indicating, in our opinion, by virtue of his *index of elimination* of 2, obtained by taking the ratio of the output for the first and third periods, that the patient

is in the so-called positive phase with an index of 1 or more, or that he is a good operative risk. We believe that by the tests of elimination employing phenolsulphonephthalein or indigo-carmin, the dyes, injected intravenously, should appear within ten minutes to constitute functionally sufficient kidneys, and that the quantitative output, determined fractionally, should contain more in the first than in the third twenty-minute period. In other words, we divide the percentage of the first period by the percentage output of the third period, thereby obtaining what we style the index of elimination, and should that not be 1 or more, the patient is said to be in the negative phase and therefore inoperable at that particular time. Should the *index of elimination* be more than 1, he is said to be in the positive phase and is considered a good operative risk. This patient falls in the positive phase class; as his *index of elimination* phthalein is 2, as stated above, we propose to do a suprapubic prostatectomy; the bladder having been drained and the kidneys decompressed by catheter, rendering the so-called two-stage operation unnecessary. Under ether anesthesia the usual suprapubic incision is made and an intra-urethal enucleation of the prostate carried out. The bleeding is minimal and no hemostasis is necessary. Should the bleeding be too great, we believe that now is the golden opportunity to control hemorrhage, and no instrument is more serviceable for the purpose than Young's boomerang needle for the introduction of a mattress-suture.

A large drainage-tube is sutured into the bladder and a small tube drains the space of Retzius, and the wound is closed in tiers.

PROSTATIC CALCULI

The third case is a patient aged forty-eight, who complains of difficult and painful micturition. This has gone on for several years and has gradually grown worse. There is no hematuria. Examination reveals that he had urethral calculi which were removed with urethral forceps through the urethoscope. *x*-Ray examination reveals that he also has many prostatic calculi and, accordingly, a perineal prostatectomy was advised. Gas-ether anesthesia is used and a rectangular-perineal incision is

made, the urethra opened at the junction of the prostatic and membranous portions, the prostatic tractor introduced, and the prostate delivered. Incisions are made into both lateral lobes and a number of small calculi are being removed. The gland itself is not enlarged; in fact, it seems to be atrophied. Fenestrated rubber tubing will be sutured into the prostatic capsule and the wound closed with no drainage into the bladder.

SEMINAL VESICULITIS

Polyclinic Hospital

The first patient this afternoon is a man aged thirty-four, who has a chronic seminal vesiculitis, for which we believe the operation of vasopuncture for medication is indicated. The vas is made prominent in the scrotum by an assistant, and the skin and superficial structures are injected with a local anesthetic. The vas is delivered, stripped of its fascia, punctured with a large sharp needle, and 3 to 5 c.c. of a 5 per cent. solution of collargol injected on each side. We recommend that the patient stay in bed for three or four days following this operation and receive no local treatment for one month. Once more we must reiterate our convictions in the superiority of vasopuncture over vasotomy, so far as stricture of the vas is concerned.

The second case is a man aged thirty-five, who has complained of some arthritic symptoms for some time. He has a chronic prostatitis which has cleared up, but he still has chronic bilateral seminal vesiculitis. The patient underwent what was apparently a vasostomy while in one of the army hospitals in 1919, with resultant stricture of the vas. We propose this afternoon to resect the vas and do an end-to-end anastomosis, much in the manner described by Mayo in 1895, thus to establish continuity of the lumen and restore fertility. The technic, as you see, consists in running a fine catgut suture through the lumen of both segments of the vas for about $1\frac{1}{2}$ cm., using a cambric needle, bringing it through the walls above and below the site of the anastomosis, and tying the suture externally.

CIRCUMCISION

The last case is an adult for circumcision in which nerve blocking anesthesia in accordance with the technic developed in this clinic fourteen years ago, and in which we take much pride as it invariably insures a painless operation. The anesthetic, cocain 1/10 of 1 per cent. in 1 : 500,000 adrenalin, is injected cutaneously, subcutaneously, and into the sheaths and septum of the corpora cavernosa deeply at the level of the proximal and middle thirds of the penis, dorsally, laterally, and ventrally. No phimosis forceps are used. The skin of the prepuce is nicked in the four quadrants about $\frac{1}{4}$ inch below the level of the corona glandis. These nicks are joined by circumcising the skin with scissors. The mucosa of the prepuce is then drawn taut upward and circumcised about 3/16 inch above the sulcus, using a scalpel. This insures a clean smooth cut with no serrations. The skin and mucosa are sutured at the frenum, using a mattress of 00 plain gut. Neither the short nor the long end of the suture carrying the needle are cut for the present. A second simple suture unites the skin and mucosa dorsally, and is continued around one side of the penis as a continuous suture and tied to the short end of the first frenal mattress-suture. The first suture is then continued around the other side of the penis and tied to the short end of the second suture. This technic gives the most perfect apposition of skin and mucosa imaginable.

CLINIC OF DRS. DAMON B. PFEIFFER AND CALVIN M. SMYTH, JR.

METHODIST HOSPITAL

OVARIAN CYST TWISTED ON ITS PEDICLE WITH CARCINOMA OF THE SIGMOID DISCOVERED INCIDENTALLY

THIS patient entered the hospital two days ago with a history of having been seized four days previously with a severe abdominal pain associated with persistent nausea and vomiting. She had been in good health and had had no preliminary symptoms of any sort. At the onset the bowels moved twice, but there was no further action, although gas continued to pass. She had always been constipated and had observed no recent change in that respect. The pain was in the lower abdomen, radiating to the back and suprapubic region. It was cramp-like at first, but later became constant. The abdomen has gradually become distended. There is no disturbance of urination. There is marked tenderness over the lower abdomen, especially on the right side, with an indefinite sensation of mass present in this region. There is tenderness on deep pressure. In the vagina an exquisitely tender mass can be palpated in the right fornix, but a satisfactory bimanual examination is impossible because of pain. The temperature on admission was 97.3° F., pulse 62, respirations 16. Leukocytes were 12,000 per cubic millimeter. The upper abdomen was relatively soft and not tender, and it was therefore decided to delay operation overnight, with the idea of permitting the patient to regain her vitality which had been much depleted by her sleepless nights, pain, and inability to retain fluid in sufficient quantity. She had been brought from some distance in the country. We find that a patient who comes to the hospital on the fourth day after an acute abdominal seizure is usually converted into a better risk by a period of

delay with proper restorative measures. This, of course, does not apply to the moribund cases who usually die whether or not operation is performed. It does not apply to intestinal obstruction which should be given an opportunity for relief by operation whenever received. With such exceptions the safest rule is not to regard a late case of acute abdominal disease as an immediate operative emergency. This woman was given saline by bowel, with morphin and digalin subcutaneously. She passed a fairly restful night and felt and looked better in the morning. Physical signs were approximately as previously noted. In the first twenty-four hours she passed 24 ounces of urine and felt quite comfortable. She was therefore carried over another twenty-four hours, the urinary output rising to 28 ounces, the temperature ranging between 99° and 100° F., the pulse-rate about 100, and respirations 24. On the morning of the second day the local signs, tenderness, and mass seemed more pronounced, and operation was determined upon, with the patient in better general condition than when she arrived.

The abdomen is opened by a lower right rectus incision, and on incising the peritoneum a quantity of slightly blood-stained fluid escapes, a dark mass presents which is quickly seen to be a gangrenous ovarian cyst twisted on its pedicle. It is multilocular, apparently benign, and is connected with the right adnexa by a small pedicle. This is transfixed, tied, and the mass cut away. Nothing can be simpler than removal of one of these pedunculated ovarian cysts which are connected only by a small pedicle and not tied down by adhesions. There is no peritonitis, and we replace the pelvic colon and prepare to close without drainage, when our attention is arrested by an area of constriction in the sigmoid. On examination this is hard and unyielding. It is not adherent to any surrounding structure and there is no evidence of inflammation. The bowel above and below is moderately dilated, but not to a degree characteristic of obstruction, and the tip of the index-finger can be passed almost through the constriction. There is no doubt that this condition is carcinoma of the typical "napkin-ring" type which is so frequently found in this area. There is nothing about

the history to make us suspect the existence of this condition (an attempt after the operation to develop a history pointing to this lesion was ineffectual. The patient had always been constipated and said that perhaps she had been more so of late, but had had no cramps, diarrhea, or bloody stools, and showed none of the general effects of malignant disease). It seems obviously improper to return this patient to her bed without removing this growth so fortunately discovered in the presymptomatic stage. The choice of operation is most important. In the presence of a considerable degree of paralytic ileus an immediate resection and anastomosis presents not only the risk of peritonitis from contamination of a peritoneal cavity containing free fluid in excess, but also the danger of later leakage due to distention and tension on the sutures. While it is true that tension can in a measure be obviated either by the use of a tube passed from below into the anastomosis or by a cecostomy, these measures are not infallible, and in any event the risk of immediate contamination cannot be excluded. On the other hand, this growth can readily be mobilized with its regional mesentery and brought out through the abdominal wall in the well-known manner described by Mikulicz many years ago, without contamination, and at the same time immediate relief to the ileus can be afforded. The growth is evidently very early and no noteworthy glandular enlargement can be detected. The peritoneum is incised lateral to the sigmoid and the descending colon, and the bowel and outer peritoneal leaf swept by gauze dissection toward the midline. The ureter, which is adherent, is carefully detached from this newly formed mesentery and placed out of harm's way. This growth is rather low, and in preparing to exteriorize it, it is necessary to sever the lateral attachments of the rectosigmoid down to the floor of the pelvis so that it comes up easily without tension. In order to achieve sufficient mobility of the affected loop it was necessary in this case also to cut the arteries of the sigmoid at their origin just above the promontory. From the point of severance as an apex a wedge-shaped resection of the mesentery was made including in its angle the affected area of the bowel.

Having accomplished the liberation of the segment of bowel containing the growth together with the dangerous area of mesentery carrying the lymph-channels centripetally from the growth, and thus providing against gangrene of the distal bowel, a point on the abdominal wall is selected just lateral to the semilunar line and in the line of the trousers belt. In this line a pad or colostomy cup will later be most easily retained by its belt without slipping up or down to permit the annoying escape of feces. A muscle-splitting incision is made, as it damages the abdominal wall the least and fits snugly about the bowel, diminishing any tendency toward later herniation. There is no thought of creating a sphincter, as this is illusory and unnecessary. Before drawing the growth through this opening I think it is well to paint it with iodin with the idea that carcinoma cells are less apt to be detached from the growth and effect a lodgment in the freshly cut tissues of the wound. Care also is necessary in this maneuver, as the friable region of the growth may be torn, allowing contamination of the abdominal cavity or the wound. The portion of the bowel which it is desired to remove should remain outside the wound without tension, as otherwise retraction is apt to occur during the succeeding days, with disagreeable or disastrous results. If this proper adjustment is made, a few sutures are sufficient to bring the wound edges snugly but not tightly about the bowel. Prior to this the entering and outgoing loops are sutured together for about 3 inches so that they will lie in contact within the abdominal cavity. We shall not remove the bowel, but place it carefully in a nest of gauze, deferring removal a few days until the wound has become sealed. The rectus incision is now closed without drainage, as there has been no contamination. The colostomy incision and adjacent bowel is dried with alcohol and plentifully plastered with sterile ointment of oxid of zinc which will shed infective materials for a time if gangrene or leakage occurs from the exteriorized bowel. A rubber tube is placed in the outgoing loop guarded by a purse-string suture in order to permit discharge of gas or fluid, which is a desideratum in this case because of the distention already present.

The patient, handicapped as she had been by her serious attack, showed serious shock at the close of the operation, and she was given an intravenous infusion of saline, and upon her return to bed was placed on continuous intravenous instillation of 5 per cent. glucose solution administered according to the method described by Matas. Later she also received 500 c.c. of blood. The condition remained precarious for forty-eight hours, but she gradually made a very satisfactory recovery, and the exteriorized bowel was removed on the second day. Beginning on the tenth day the septum between the two loops was cut by a clamp inserted according to the method described by Mikulicz, one blade of the clamp being placed in each opening and closed to cause pressure necrosis of the intervening tissues. The peritoneal cavity is protected against contamination in this procedure as a result of the cohesion which has occurred between the two loops of bowel following their union by sutures at the first stage. A Kocher clamp may be used for this procedure, and a second bite is usually necessary to make the opening deep enough below the abdominal wall. Part of the bowel contents now began to pass into the distal segment and to be evacuated normally. Considerable discharge still occurred, however, through the fecal fistula. Three weeks later, by a plastic operation under local anesthesia, the bowel was closed without opening the abdominal cavity and the abdominal wall sutured above. A small fecal fistula reappeared, which finally closed in about six weeks.

Comment.—This operation, so well devised and planned by Mikulicz, we employ in a considerable percentage of cases of carcinoma of the large intestine. If properly done in most cases it permits of as wide excision of bowel and the associated mesentery as is possible by any method of immediate excision and anastomosis. We have noted a disposition in some quarters to decry this operation on the ground of incompleteness, but in most cases, providing the large intestine is properly and sufficiently mobilized, there is no difficulty on this score. A further objection has been the implantation of carcinoma in the wound through which the growth is drawn. To guard against this we

paint the entire carcinoma thoroughly with iodin before passing it through the abdominal wall. It is, of course, true that tugging a growth through the freshly cut tissues is risky, but we believe that thorough iodinization of the growth will obviate this criticism. Of course if diseased bowel is cut through at the colostomy opening there will not be a recurrence, but a continuation of the growth. This is an evidence of insufficient mobilization of the bowel. Certain surgeons have had difficulty through retraction of one or other of the loops which is likely to set up a peritonitis, but here again thorough mobilization is the preventive of such a complication. No attempt should be made to fix the loops of a bowel under tension to the abdominal wall, as retraction will certainly result. The loops should lie freely and easily at the point of emergence and should be fixed by sutures, and if there is any doubt, by transfixing with safety-pins. There is the undoubted advantage that there is no danger of sepsis from the primary operation, as the bowel is not opened until it is withdrawn from the abdomen. If obstruction is not present it is well to postpone opening of the bowel for a day or more. The loop may be allowed to remain in the dressings or it may be cut between clamps and removed immediately. If obstruction is present, drainage may be instituted immediately by fixing a tube either of rubber or one of the specialized glass tubes devised by Mixter or Paul in the proximal bowel. This can readily be done without danger of soiling the peritoneal cavity or the wound. My own experience with this operation has been so satisfactory that I wish to add my recommendation to that of Dowd who so well described the procedure in the Annals of Surgery, 72, 681, December, 1920, and to the appreciative comments which have appeared in the writings of the Mayo Clinic. Its chief disadvantage is the length of time necessary to secure a complete healing of the necessary colostomy, and the fact that an additional plastic operation is usually necessary. When obstruction is not present and the involved bowel is not covered with fat or is not largely retroperitoneal and without mesentery, factors which militate against safe immediate anastomosis, it is preferable not infrequently to make an

immediate intra-abdominal resection followed by an anastomosis guarded by a tube below or a colostomy above to prevent development of pressure on the suture line. The Mikulicz operation also is inadvisable when the growth is in the pelvis or so situated anatomically that sufficient mobilization cannot be accomplished to permit exteriorization of the diseased tissues. It is useless to perform this operation in a condition known to prohibit complete surgery. Under these circumstances only a simple colostomy is warranted, or in more favorable cases a lateral anastomosis to sidetrack the obstruction.

OPERATIVE TREATMENT OF THE INTERNAL ABDOMINAL RING IN INGUINAL HERNIA: SIMULTANEOUS REMOVAL OF THE APPENDIX

THIS patient is a man forty-five years old who has been engaged in a sedentary occupation for many years and has taken but little exercise. His general health has been good, but he has become fat and flabby and has accumulated a great deal of abdominal fat. The abdomen is protuberant below. About a year ago he noticed discomfort in both groins, and found a fulness in these regions which were diagnosed as hernias. He attempted to wear a truss, which annoyed him, and he went without it most of the time, with the result that both hernias gradually enlarged, finally becoming scrotal. There was never any difficulty in reducing them, nor has he had any attack of incarceration or strangulation. Even before the hernias appeared he had been suffering from indigestion, consisting of lower abdominal pain occasionally associated with nausea and vomiting. He has been told that his appendix was diseased and he is moderately tender in the right iliac fossa. There is no tenderness in the gall-bladder region. Organically he is otherwise sound. This is the type of case which often develops direct hernias as a result of weakening of the lower muscular and aponeurotic structures of the abdominal wall. He has the so-called Pool bulge. On examination, however, the course of the hernia can be followed upward toward the internal ring, so that it is believed that these hernias are of the indirect variety. In the modern conception

of hernia the rôle of the sac has been properly emphasized, but it seems probable that the attention which has been directed to this factor has resulted in insufficient appreciation of the rôle played by the muscles and aponeurotic structures of the abdominal wall. A vast number of individuals go through life with an unobliterated processus vaginalis, but never have a hernia. Obviously, there is a protective mechanism in such cases. This consists, we believe, first, in the existence of a strong and narrow opening through the transversalis fascia, and, second, in the external protection afforded that opening by the overlying muscles and aponeurosis and especially by the shutter-like action of the internal oblique and transversalis muscles which under muscular strain are drawn downward over the opening holding the walls of the patent funicular process in contact and maintaining its obliquity with reference to the peritoneal cavity, thus preventing the direct thrust of its contained viscera into the long axis of the canal which would inevitably succeed in opening it up. The funicular process and the size and structure of the internal ring are primarily the result of congenital conditions. The arrangement of the musculature also is largely dependent upon congenital factors, and we find many variations in origin and attachments which doubtless have considerable bearing upon the exercise of their defensive function. In rodents the funicular process is normally open and permits the testicles to occupy sometimes an intra-abdominal and sometimes an extra-abdominal position, though hernia is exceedingly rare owing to the sphincter- or shutter-like action of the analogous muscles. It is common for muscles to deteriorate and become weak, and so it happens that after loss of weight and debilitating diseases and, as all abdominal surgeons have observed, after operative incisions which have weakened or altered the action of the abdominal muscles, hernias of the indirect variety frequently first make their appearance in sacs which are obviously preformed. These considerations are important in planning operative measures for the relief of hernia.

For a number of years surgeons were entirely satisfied with the results of the classical Bassini operation until the advent

of adequate follow-up systems revealed the fact that the recurrence rate was far greater than had been supposed. It appeared, however, that recurrence varied greatly in different types of cases. The younger the case, the less the liability to recurrence and the simpler the operation necessary. In young children simple removal of the sac had been found to be sufficient in practically every case. In older individuals, and par-

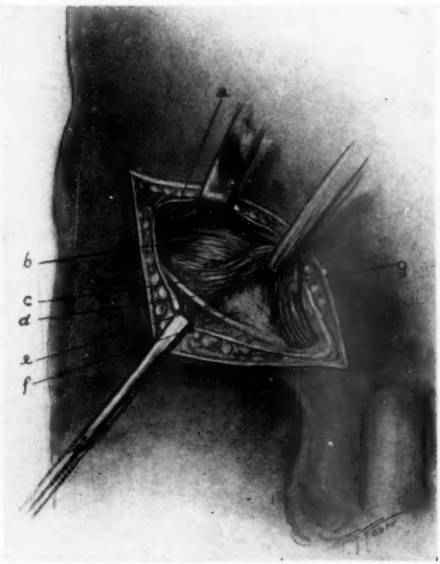

Fig. 89.—Position and size of the normal internal abdominal ring, indicated by dotted lines.

ticularly those with poor musculo-aponeurotic structures, the recurrence rate was high both in the indirect and direct variety of hernia, though naturally more so in the latter, and various expedients of fortifying the abdominal wall have been advocated. In other words, without particularizing further, it is obvious that each hernia must be attacked individually with an appreciation of the principle factors responsible for its production, and appropriate measures must be applied in every case to correct

the anomaly present, whether congenital or acquired. There is no difference of opinion in regard to the necessity of removal of the sac or at least its complete closure at the level of the internal ring. There has been a general effort to reinforce the outer retaining walls of the abdomen by various plastic procedures, but the third, and to us an extremely important, factor, namely, the opening through the transversalis fascia, has received too little consideration, and it is only within the last few years that

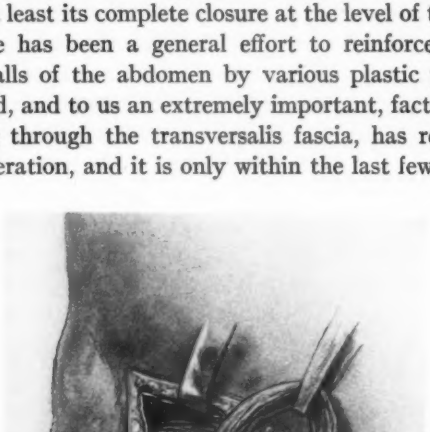

Fig. 90.—Dilatation of the internal ring which occurs in hernias of long standing, and method of locating the fascial edge.

attention has been more strongly directed to the importance of this structure through the writings of Pitzman, Andrews, and a few others. I have come to believe that no operation for hernia can be considered satisfactory or complete unless the dilated opening through the transversalis fascia is closed by sutures which definitely unite this structure without taking it for granted that suturing the arching fibers to Poupart's ligament will accomplish the necessary closure of the internal ring. In the

majority of instances it is true that suturing the muscles according to the usual technic will succeed in approximating the margins of the opening through the transversalis fascia which is adherent to the under surface of the muscle, but in a large percentage of cases this hit-or-miss method will leave considerable separation which is not filled in with sufficient tension-resisting tissues, with the result that the internal abdominal pressure readily dilates this structure once more and drives a dilating cone into the upper opening of the inguinal canal. Such a mechanism will in the long run dilate the canal just as surely as the amniotic sac will dilate the cervix. Once started between the muscular planes, it will continue and give rise to recurrence. If any surgeon will take the trouble to insert his fingers through the opening in the transversalis fascia after he has ligated the sac and dropped the stump, he will be surprised to find in many instances how large an undefended space is present. The method of repair which I have adopted in these cases you will see illustrated in this case.

By the usual incision through the skin and aponeurosis of the external oblique the cord is exposed and lifted from its bed. A half-turn outward brings the sac into view covered by the cremasteric and infundibuliform fascia which are here indigtinguishable. Dividing these gently with a knife, the sac is exposed, opened, and freed in its entirety by the combination of sharp and gauze dissection. The peritoneum is well separated at the internal ring, ligated high by transfixion ligature, the redundant portion cut away, and the stump allowed to retract. In this case you see three fingers can be inserted with ease through the internal ring, which should be only large enough to permit easy exit of the cord. It is next in order to identify and secure the edges of the transversalis fascia. With the cord drawn upward the finger is passed through the opening and its edges palpated, applying a little tension which readily displaces the muscles. An edge can always be felt on the deeper surface of the transversalis muscle, and, rolling this muscle outward, it is seen that this corresponds to a definite fascial structure which is, however, closely applied to the under surface of the muscle.

It is seized with hemostatic forceps at two or three points in order to secure control. It is not always easy to make out this structure at the inferior or lower edge where it is thinner as it passes beneath Poupart's ligament on its way to form the anterior sheath of the femoral canal, but on this side we have Poupart's ligament which is available for anchorage of the upper

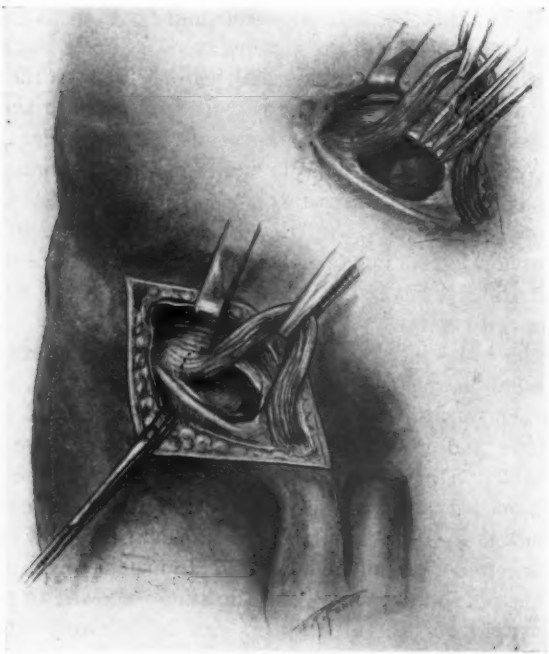

Fig. 91.—Showing clamps applied to the edge of the dilated fascia preparatory to suturing.

margin. Two or three interrupted sutures are then placed between Poupart's ligament and the upper edge of the transversalis fascia and left long until the last suture is placed, owing to the technical difficulty of placing the last suture if the first be tied at once. With these sutures well tied the ring is reduced at once to its normal size. Now the remaining problem is the one

of external reinforcement which can be carried out in various ways in accordance with the exigencies of the case. The strongest possible reinforcement can be made, I believe, with Gallie's method of living sutures taken from the fascia lata of the thigh, and this device enables us to deal with hernias which are otherwise inoperable because of the insufficiency of the tissue available locally.

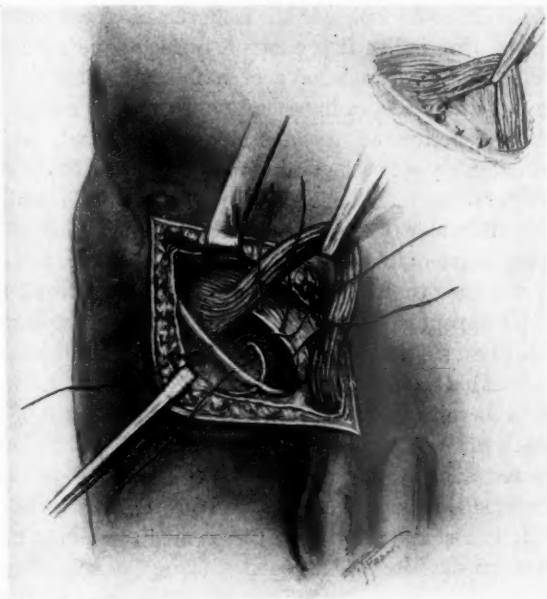

Fig. 92.—Method of closure.

Next in order of efficiency I would place the method recommended by Stetten, of New York, by whose technic the aponeurosis of the external oblique is overlapped, the cord being allowed to emerge through an incision in the lower leaf of the aponeurosis. This reproduces very closely nature's method of forming fascial openings such as the internal and external rings. In my experience it has been a very satisfactory method. There is no objec-

tion to the use of a flap from the anterior sheath of the rectus, but it seems unnecessary if this technic be adopted, and in indirect hernia it adds nothing to the closure of the internal ring. I have said nothing about the use of the arching fibers of the internal oblique and transversalis because I believe that while they are not entirely useless they are so much less satisfactory for the purpose of closure that they can be neglected, and I doubt the advisability of traumatizing these muscles by sutures. Neither do I plicate the transversalis fascia internal to the internal ring unless it presents a break or great relaxation. For the last two years I have been following this technic in operating for hernia, and have had no recurrence except in one case where I performed a phantom operation, and, finding no sac, contented myself with going through the steps of the original Bassini operation. This man in about nine months had a real hernia on this side which was attributable, I believe, to the weakening effect of the operation upon the muscles. You will note in this case that before closing the sac I searched for the cecum and appendix, but was unable to bring them down into the field. I waste no more time in this procedure, as I believe it is inadvisable to make an appendectomy difficult by working through a hernial incision. Appendices which can be easily removed in this way are, as a rule, not diseased, and those which are diseased and difficult of removal bring danger of infection and hemorrhage as complications, both of which I have known to occur. It is a simple matter in these cases to enlarge the skin and aponeurotic incisions upward, making a muscle-splitting incision higher up through the internal oblique and transversalis according to the usual McBurney technic, and thus deal with the appendix under complete control. You see this appendix is subcecal and tied down by adhesions. Its removal through the hernial opening would have been extremely difficult if not impossible. It would seem from the pathology present that the digestive symptoms of which the patient complains might easily be accounted for by the disease of the appendix. I have, therefore, not examined the gall-bladder, although he is of an age and general physical habitus which suggests cholecystic

inflammation. (The patient's digestive symptoms were completely relieved by the operation.)

I shall close the aponeurosis of the external oblique according to the technic described by Stetten in the Annals of Surgery, 78, 48–60, July, 1923, where you may get the detailed description. The skin is closed with interrupted sutures of fine silkworm-gut. We will now operate upon the left side, expecting to find practically an identical condition. (This hernia presented features similar to those already described and the same operative treatment was applied.)

GASTROJEJUNAL ULCER

This patient, W. T., a man aged sixty-two, comes to us with a long-standing history of gastro-intestinal trouble, and is at present under our care for the second time. In September, 1924 he was admitted complaining of epigastric pain, acid eructations, a feeling of fulness in the abdomen, and some loss of weight. His pain was usually relieved by food, and he had intervals during which he was relatively free from trouble. He stated that his symptoms had appeared first in 1922. In going into the past history, it developed that in 1914 he had had some sort of an acute abdominal attack, for which he had been operated upon, but from the history it appeared that nothing more than an incision of the abdominal wall had been done. We were unable to secure any further information on the subject. From 1914 to 1924 he had been in good health. After routine study a diagnosis of chronic duodenal ulcer was made, and we operated upon him on September 11, 1924. At operation the abdomen was entered through a mass of adhesions involving the anterior wall of the stomach, and the gall-bladder, duodenum, and transverse colon were all found to be involved by adhesions. This led to the conclusion that the operation in 1914 had been done following a perforating ulcer which had formed an abscess. A large indurated ulcer was found on the first portion of the duodenum, and a posterior gastro-enterostomy was done, using the method of Moynihan, and employing No. 0

chromic catgut throughout. The margin of the transverse mesocolon was attached to the stomach about ½ inch proximal to the anastomosis, and the distal portion was anchored by two or three interrupted sutures. After an uneventful convalescence the patient left the hospital on the seventeenth day after operation, and was told to report to his family physician.

On October 7, 1925, just one year after leaving the hospital, he was readmitted complaining of constant pain in the epigastrium, and said that he had lost 20 pounds in the past nine months. He frankly admitted that he had failed to follow his dietary regulations. The pain this time bore no relation to food, and had become much worse during the two weeks prior to his admission. His general condition as regards circulation, kidney function, etc., is good. The stools show a strongly positive reaction for occult blood. With this history an abdominal exploration is warranted, and we have not felt that it was necessary to subject him to the time and expense of an exhaustive study. The diagnosis rests between a marginal ulcer and malignancy. We strongly favor the former.

The patient has been given ether, and we will open the abdomen through a left rectus incision. As we open the peritoneum you will note that the upper abdomen is a mass of adhesions. As we separate these we are able to draw the stomach into the wound, and it seems to be free from any lesion. The duodenum just distal to the pylorus is very much thickened, due no doubt to the old ulcer. Here is the region of the gastroenterostomy, which we will proceed to free. This is quite difficult, but it is now clear and we note that the posterior aspect is thickened and indurated. This is unquestionably a marginal ulcer. The gastrocolic omentum being freed, we will now place a clamp on the stomach and cut away the gastric portion of the anastomosis, and this brings the ulcer into view on the posterior margin. It is about 1 cm. in diameter. Now we have cut away the jejunal portion of the anastomosis, and it does not seem that we will be able to close the jejunum without encroaching too much on its lumen. This will necessitate a change in our plan of operation in order to meet the condition. We will

do a pylorectomy, turn in the duodenal stump and the open end of the distal jejunum, and then anastomose the open end of the stomach to the side of the distal jejunum. We will then implant this short segment of the proximal jejunum into the distal portion lower down by an end-to-side anastomosis. This is essentially the operation described by Moynihan, and is not to be confused with the "Roux en Y" operation. You will note that we are using absorbable sutures throughout in these procedures. We have given up the use of non-absorbable material in all work upon the stomach and small intestine, and we have

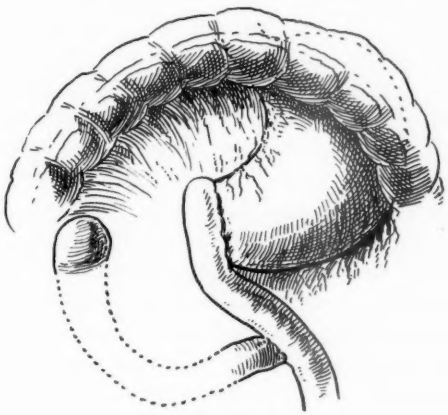

Fig. 93.

found no reason to return to the older plan. The appendix was removed at our first operation, and there does not appear to be anything wrong with the gall-bladder or other viscera, so we will terminate the operation after placing this cigarette drain in the subhepatic fossa. We will close the abdomen in tier, using a doubled suture of chromic catgut and reinforcing sutures of silkworm-gut.

This man has had a good deal of surgery, and the anesthetist has just reported that his pulse is becoming quite rapid and thready. We will, therefore, ask the doctor to start intravenous saline, and we will introduce this through a cannula

which is tied into the vein rather than through a needle. We do this, as we may wish to continue the introduction of fluid into the vein afterward. We have employed the continuous drip of glucose intravenously in a number of cases lately, with a great deal of satisfaction. The procedure is quite simple, and we have on one occasion kept this up for five days. We use a 5 per cent. solution of glucose, and allow it to go in at the rate of from 40 to 60 drops per mniute. Sugar will almost invariably appear in the urine at the end of the first twenty-four hours, but this is met by the administration of insulin. The patient has now had about 800 c.c. of salt solution, and his pulse is of better quality, although still quite rapid. We will, therefore, start the glucose as soon as he has returned to the ward.

Marginal ulcer is probably the most annoying complication of gastro-enterostomy. Improvement in technic, restriction of the indications for the operation, and better after-treatment have to a great extent practically eliminated the others. This complication seems to occur after every form of gastro-enterostomy, but about twice as many occur after anterior gastro-enterostomy as do after the posterior method. Most of the cases occur during the first year after the operation. The cause of the development of gastrojejunal ulcer has not yet been made clear, and is probably not the same in all cases. The opening of the anastomosis may have been too small, there may have been bruising of the tissues resulting in the formation of a hematoma, there may be delayed union of the edges of the junction due to the use of non-absorbable sutures, or there may be a persistently high acidity favoring the development of this form of ulceration. The most logical explanation of the situation is to be found, in our opinion, in the continuation of the cause which produced the original ulcer. For this reason we believe that the appendix should be removed routinely in operations for gastric or duodenal ulcer, and that the gall-bladder should be carefully examined, and, if found diseased, treated accordingly. We lay special stress upon a dietetic and medicinal régime which will neutralize the acidity characteristic of most cases, showing this complication and finally oral septic foci must

be completely eliminated after the operation if they have not been gotten rid of previously. In the case which we have just operated upon no non-absorbable suture material was used, the appendix was removed, and the gall-bladder carefully examined. The teeth were not a factor, as they had been extracted prior to the first operation. This case was, in all probability, the result of the patient's failure to carry out instructions as to his habits of life after the first operation.

This patient is now symptom free.

CLINIC OF DR. MOSES BEHREND

JEWISH HOSPITAL

THORACOPLASTY FOR TUBERCULOSIS OF THE LUNGS

A. L. Female. Age thirty-six.

Present Illness.—Since the patient had influenza seven years ago she claims her cough has persisted. Coughing is worse in the morning when she awakens, expectorating large amounts of whitish material. During these seven years she has been to various sanatoriums. Hemorrhages took place on several occasions, but none within the last year. She has lost about 40 pounds in the last six years, weakness is extreme. She does not have night-sweats.

(Other portions of the history have been omitted.)

Physical Examination.—Chest thin; clavicles prominent; supra- and intraclavicular fossæ prominent; a few distended veins are seen. Expansion fair, greater on the left side; scapulæ somewhat prominent.

On percussion the entire right side has somewhat of a tympanitic note. The left is resonant except at the apex, where it is dull, vocal resonance and fremitus is increased on the right side and left apex both anteriorly and posteriorly; bubbling râles are heard throughout the right side subcrepitant to the left apex. The breath sounds approach the tubular variety, and at about the fourth rib "powder-puff can be heard." There is bronchial breathing at the left apex.

Heart negative; sounds good; heart small.

By Dr. Jacobs (11/20/1925).—There is a distinct hyperresonant note over the upper right lung anteriorly, with marked cavernous breathing on inspiration and expiration; no râles to be heard on this area.

Posteriorly there is dulness as far as the lower angle of the scapulæ on the right. No râles to be heard. This suggests that we have to deal with either a large cavity or a localized pneumothorax around the area of the upper right lung. Below, at the level of the right base, tactile and vocal fremitus are very faint; no râles to be heard except a few subcrepitant anteriorly. These would suggest then a lesion in the lower lobe.

The left lung shows an infiltration of the apex manifested with scattered subcrepitant râles at the apex.

x-Ray Department (3/28/1925. Plate 21,969): There is a pneumothorax of the upper right lobe extending down to the third rib. At this point is seen a dense interlobar fibrous band extending from the hilus to the periphery, and just below this are seen one large and two or three smaller cavities. The middle lobe of the right lung and the lower lobe show emphysema. There is present a large cavity in the subapical region of the left apex surrounded by moderately infiltrated lung tissue. The left lower lobe shows a moderate degree of peribronchial and alveolar infiltration. The heart is small and shrunken. The right diaphragm is slightly flattened and depressed, being at a lower level than the left. The left diaphragm is normal.

9/2/1925. Plate 23,398: The pneumothorax, previously noted in the right apical and subapical region, remains as before. There is slight increase in the amount of scar tissue and alveolar infiltration in the interlobar space and just below this. The large cavity previously mentioned in the left apex remains the same. There are practically no other differences.

11/23/1925. Plate 24,253: There is no change in the pathologic process previously noted in the left lung. The left diaphragn is normal. In the right lung the localized pneumothorax in the apex remains as before and extends downward to the third rib. The rib resection has caused a considerable change in the left outer base, there being now a marked increase in the alveolar infiltration and a slight pleuritic thickening noted here. Retracted lung and scar tissue with adhesions remain as before. The right diaphragm is now normal. The heart is not displaced.

This patient, as you have heard, was under the care of Dr. Jacob for several years. He is able to give you the course of the disease in this patient on account of his long association in this case as her physician. She was under his care at the Eagleville Sanitarium several years ago. Here the sputum was positive. Six months after her discharge she developed a large hemorrhage; 500 c.c. of nitrogen gas was used in the right pleura. The hemorrhage

Fig. 94.—The operation completed. Notice the difference in the two sides. The patient has had a normal temperature for the first time in months.

stopped at once. Subsequently she got 500 : 1000 c.c. every ten days. The temperature dropped, but in spite of the rest and good treatment the patient was failing. The temperature did not remain down for any length of time, and, to make matters worse, hemoptysis again recurred.

It was noticed, however, that the gas did not have the desired effect. It was then suggested that an extrapleural thoracoplasty

be performed. The operation should not be performed, however, if the gas can control the disease. To Wilms and Sauerbruch must be given all credit of developing the technic for the performance of this operation. The operation is usually performed in two stages, but there is no objection in some cases to do it in three stages. To insure complete rest of the side effected it was proposed that the phrenic nerve be cut across or teased out. This

Fig. 95.—The result following the removal of the four ribs alluded to in the text. The chest has become depressed, the effect of which is already noticeable on the *x*-ray plate. This illustrates only the first stage of the operation.

has been done, with good effect. Naturally part of the diaphragm on the same side became paralyzed.

Note that we used large volumes of novocain which was injected locally over a large area of the back. We will give a little nitrous oxid gas just for the purpose of producing analgesia.

With the patient on the left side a large circular flap is being made which exposes the latissimus dorsi and the serratus magnus especially.

This gives us a wonderful exposure of the chest wall. The tenth to the sixth ribs were excised, about 6 inches of each rib being removed. The operation was easily performed, the time

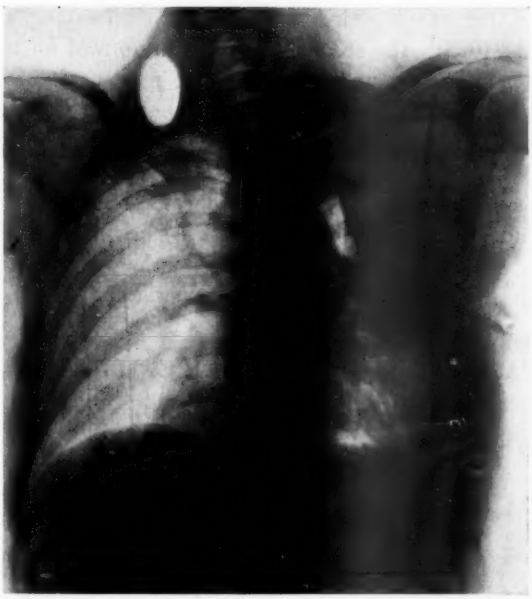

Fig. 96.—Extrapleural thoracoplasty: Shows resection of ribs from second to the eighth. The ninth, tenth, and eleventh ribs are not shown. The lung is collapsed.

consumed being about twelve minutes. At one point the pleura was nicked. This did not seem to cause any trouble. Almost immediately a change is noted, the chest wall caves in, leaving quite a concave surface where formerly we had a convex contour (Fig. 94).

As this was only the first stage in this operation, it must be noted that the other ribs will be excised until we have removed

the entire chest wall from the postaxillary line to the paravertebral line. It is better to perform this operation in two or three stages on account of the better results that will be obtained. These patients, as you all know, are at best poor risks, therefore it is a rather hazardous undertaking to remove too many ribs at one sitting.

The convalescence of this patient was uneventful. She had, as usual, her evening rises and morning remissions.

11/30/1925: The second stage was performed on this date. The remaining ribs were removed. It may be interesting to note that the patient had a slight hemorrhage on November 28th. Dr. Jacob did not consider this a contraindication to operation. The patient made a fine recovery.

Figure 95 shows the result following the removal of the four ribs alluded to in the text. The chest has become depressed, the effect of which is already noticeable on the *x*-ray plate. This illustrates only the first stage of the operation.

CASE OF EMPYEMA OF THE GALL-BLADDER

T. S. Age forty. Female. Admitted to Mt. Sinai Hospital October 15, 1925.

For fifteen years the patient has had pain in the epigastric and hypochondriac regions. Pain would radiate to the back and right shoulder. The attacks of pain occurred two or three times a week, rarely at night, which is rather unusual. Her appetite was fair, although she suffered a great deal from indigestion and oppression in the epigastric region. She says at times her abdomen "swelled with gas." Nausea was almost constant. This train of symptoms continued until the day before admission to the hospital, when the pain became intense, accompanied with nausea and vomiting. She vomited bile.

Physical examination of the abdomen showed a much enlarged liver and a gall-bladder so tender as to be hardly palpable. The abdomen was quite rigid, but through this rigid abdomen could be felt a much enlarged gall-bladder extending several inches below the liver margin.

A diagnosis of empyema of the gall-bladder with cholelithiasis was made; most likely of the single stone type occluding the cystic duct.

QUESTION: How do you prepare these patients for operation?

ANSWER: On admission the patients are put in the Fowler position, nothing is given by mouth. Enteroclysis of sodii bicarb. and glucose, 5 per cent. of each, plain tap-water or saline is given by the drop method. If necessary hypodermoclysis is also given. The main object is to get as much water into the system as possible. This dilutes the toxins and assists in reducing inflammation in the region of the gall-bladder. That this is so was exemplified in a case where an external biliary fistula was present. After the Murphy drip was started enormous volumes of bile ran out of the fistula, keeping the patient continually wet until the Murphy drip was stopped. It illustrates the tremendous good derived from continuous enteroclysis. After the use of the Murphy drip for a few days the patient complains little of thirst, the general condition improves, the temperature recedes, and the pulse moderates.

This may consume a week or ten days or less, depending on the seriousness of the infection, the size of the gall-bladder, and the amount of pathology present.

QUESTION: Do you fear rupture of the gall-bladder waiting for the symptoms to subside?

ANSWER: No, because in twenty-five years' experience I have encountered only 2 cases of rupture of the gall-bladder. These 2 patients recovered. Even if rupture should occur during the course of treatment, operation can be performed readily because these patients are in the hospital.

After the symptoms have subsided (and by this we mean that the temperature has been normal for several days, the pulse practically normal, and the tender gall-bladder is freely palpable without pain) the gall-bladder may be removed.

In fact, every gall-bladder the seat of empyema may be removed without fear of morbidity or mortality. We know that this is a rather broad statement to make, but we repeat un-

equivocally that there is no more danger performing a cholecystectomy in these cases so treated than there is doing the same operation for a chronic cholecystitis.

Our mortality is exceedingly low; I do not wish to quote statistics on account of their proverbial unreliability. Since January 1st we have not lost a single case of cholecystectomy. We attribute this merely to our preliminary treatment.

Every case before operation has a blood-count, full urine examination, blood urea nitrogen test, and Wassermann.

Operation.—When the abdomen was opened a large turgid gall-bladder was noted. It extended almost to the line of the pelvis. The liver was much enlarged and extended about 3 inches below the costal border. The gall-bladder with the liver was rolled out of the abdomen. Note how the retractors are held and how the sponges are placed. This leads to a successful and quick operation. The right free border of the gastrohepatic omentum is now incised, the cystic duct and the common duct are easily seen. Note also that at the junction of the cystic and hepatic ducts there is a very large blood-vessel, which is undoubtedly the hepatic artery. The cystic artery is just a small thing which is now caught in the hemostat. How beautiful the field is if a proper dissection of the overlying peritoneum is made!

After removal of the gall-bladder it was opened; many stones and a large quantity of pus oozed out.

The after-treatment is the same as before the operation. Lots of water and more water. We can give by the continuous method of hypodermoclysis 3000 to 5000 c.c. in twenty-four hours.

All our operations, including gall-bladder work, are performed under nitrous oxid of gas and oxygen. For the past seven or eight years we have rarely used anything else. It is safer in expert hands than ether. There is less disturbance of the kidneys and bodily functions in general. Pneumonia is practically unknown, although it does occur occasionally. There is a marked difference in the incidence of this complication as compared to ether. We do not use spinal anesthesia at all.

CASE OF OBSTRUCTION OF THE COMMON DUCT

Operation.—Cholecystoduodenostomy.

Excerpt from history of J. B. Age forty-seven. Male. Salesman.

Chief Complaint.—Jaundice; slight pain in upper right abdomen.

Present Illness.—Since August, 1924 the patient has had three attacks of sharp pain in midepigastrium and right upper abdomen, relieved by morphin, with intervals of digestive disturbances and some constipation. The last attack was on October 16, 1925, with headache, chills and slight fever, and then a progressively increasing jaundice with slight pruritus. Clay-colored stools and bile in the urine ever since. Some weight lost (about 27 pounds in the last year). Wassermann is negative.

Physical examination reveals intense jaundice. The liver is slightly enlarged. The right rectus muscle is somewhat rigid. The gall-bladder is slightly enlarged and somewhat tender. No mass is felt.

The preoperative preparation in these cases is most important because the first great problem in these jaundice cases is hemorrhage. Calcium chlorid in some form or other will prevent hemorrhage. Afenal, a preparation of calcium chlorid, comes in capsules already sterilized. Depending upon the coagulation time, 2 or 3 capsules are given every two days, including the day of operation. This patient received three doses. His coagulation time is now five minutes. It was ten. At operation this man was found to have a very small gall-bladder with walls somewhat atrophied. The common duct is free, but at the papillæ of Vater is found a swelling, a tumor which feels like a carcinoma. It is too soft to be a stone. The pancreas is soft except at or near the papillæ of Vater. Never take out the gall-bladder in those cases because it is of great use in our anastomosis of it with the hollow viscera. There are practically no adhesions between the duodenum and the stomach and the gall-bladder. The liver is an odd color due to the continued jaundice. I am going to perform a cholecystoduodenostomy.

I prefer to use the duodenum, but if this cannot be used, the stomach may be anastomosed to the gall-bladder with equally good results.

Unfortunately, you will note that we have only a small gall-bladder with which to perform an anastomosis. It is best not to attempt any removal of a tumor in the region of the papillæ of Vater. It is not necessary to probe the duct, because we can readily feel the cause of the jaundice. The common duct is a little enlarged.

Operation.—With a linen thread suture we attach the duodenum to the gall-bladder. The gall-bladder and the apposing surface of the duodenum are incised, care being taken to have the stoma quite large. After the incision through all the coats are made the apposing mucous membrane of the duodenum and the gall-bladder are sewn. The serous coat suture is the final stitch. If our diagnosis of carcinoma is correct the patient will have relief for a long time. He will be relieved of his jaundice, he will gain weight, and feel better. One must be sure that the stitches are properly made, because I do not know of any worse complication than a duodenum fistula. The patient practically starves to death because of the loss of this important secretion. These cases are never drained because we have great faith in our method of performing the anastomosis. It is good practice after the anastomosis is completed to sew a piece of the lesser or greater omentum over the line of suture.

A remarkable change should occur in this man in forty-eight hours after operation. On the fourth day after operation the patient's color had almost returned to normal. His appetite increased. A change in his general appearance, of one of depression characteristic of jaundice cases to one of exhilaration and delight, was most marked. He gained weight. The stools were again normal in color.

As I have stated in various articles before on this subject, I am a firm advocate of internal drainage in these profound jaundice cases. External drainage of the gall-bladder in this case would have meant a biliary fistula as long as the patient lived. True, the jaundice would have been relieved, but his

system would have been denied the nutritive influence of the bile. When we perform internal drainage operations we accomplish the same results with the additional advantage of the good effects of the biliary secretion. An external drainage operation on the gall-bladder is easier to perform, but why sacrifice the only chance the patient has of ever enjoying life again?

CONTRACTURES DUE TO BURNS OF THE FACE, NECK, AND BODY

I. S. Age five. Male. Admitted March 4, 1925.

Present Illness.—Six months before admission patient was burned while playing with matches. Sent to a neighboring hos-

Figure 97 shows the condition of the boy when admitted to the hospital. You will note that the contracture is so marked the child is unable to close the lips and mouth; the teeth are not apposed; he is unable to chew his food. He is poorly nourished and anemic. The chin is pulled down in the suprasternal notch and cannot be felt through the dense scar tissue. You will also note that the entire anterior chest wall and part of the abdomen is the seat of contractures.

pital, where he remained five months. On account of the contractures the parents signed a release when the child was admitted to the Mt. Sinai Hospital.

Fig. 98.

Fig. 99.

Figs. 98, 99.—Our first attack was along the lateral surface of the neck on either side and the front of the chin. This was done for the purpose of restoring the body of the inferior maxillæ and the mental tubercles which constitute the chin. In these illustrations we are performing tubular grafts for this purpose.

Fig. 100.—Just before transferring these grafts to the neck the head was shaved, so that a dressing of adhesive plaster could be applied to prevent tearing away of the grafts by turning the head in the opposite direction.

Fig. 101.—The transfer of the graft has been made from the left arm to the chin, and we are about to cut the pedicle. Note that on the right shoulder another tubular graft has been prepared for the body of the maxilla on this side.

Fig. 102.

Fig. 103.

Fig. 104.

Figs. 102–104.—The transfer of the graft to the right side has been made and the head has been drawn to this side by the adhesive plaster. The graft on the left side has taken. We wait from ten days to two weeks between the formation of the graft and its transference.

On the left side you will note a slight redundancy of skin, but in time this will conform to the natural curve of the neck. If it does not, it will be rather easy to smooth out the skin. All the grafts and all exposed surfaces prepared for grafts were dressed with paraffin gauze, a very efficient method of preventing the agglutination of the dressings.

Now he is able to close his mouth and masticate his food. When he was first admitted to the hospital he swallowed his food whole.

Fig. 105.—Both sides of the maxillæ have now been covered; a new covering for the chin has been completed.

In these cases one must exercise the greatest patience. Too much work must not be done at one time, nor must it be performed too soon after the last procedure. In other words, the patient must be given an opportunity to regain his vitality.

The operations were begun on March 13, 1925, and practically the last operation was performed on October 30th. There remain now a few minor procedures. These will not be attempted until the child has fully recovered from the last operation.

Fig. 106.

Fig. 107.

Figs. 106, 107.—A large surface of the neck still remains to be covered. While the neck was being prepared for the long pedicle graft to cover in the raw surface an adhesive plaster dressing was applied to prevent the contracture from recurring. About this time summer was approaching, and on account of the hot weather it was decided to postpone further work until the fall and allow the child to recover from the effects of the previous operations.

Fig. 108 shows the grafts in position, with some return of the contracture. He is able to close the lip and bring the teeth in apposition.

Fig. 109.—The transference of the large rectangular flap from the back was performed before the members of the Clinical Congress of Surgeons. A tubular graft was first made as shown in Fig. 98; this was allowed to remain intact for ten days, when a large rectangular flap was added to it. This flap was completely raised, then replaced, and allowed to remain ten days, when it was transferred to the neck. This practically will complete the transference of large grafts.

CLINIC OF DR. ROBERT H. IVY

POLYCLINIC HOSPITAL

PLASTIC AND RECONSTRUCTIVE SURGERY

Case I. Repair of Traumatic Saddle Nose.—A. P., male, aged twenty-two. Had nose fractured two years previously while playing football. This resulted in depression of the bridge and interference with respiration. Obstruction to respiration was recently corrected by submucous resection of septum.

Examination showed patient to be a well-developed man with no apparent physical abnormality except depressed bridge of nose. The nasal bones were dislocated backward and slightly spread laterally. The lower part of the bridge was also depressed due to buckling of septum. There was no deficiency or scarring of the overlying skin (Fig. 110, *A*, *B*). This case represents one of the simplest forms of nasal deformity requiring correction, the lining and covering being intact, the deficiency involving only the supporting structure. Under colonic ether-oil anesthesia a longitudinal incision 3 inches in length was made near the lower part of the sternum, $2\frac{1}{2}$ inches to the right of the median line, the lower border of the incision extending over the costal margin. The fibers of the rectus abdominis muscle were separated, bringing into view the lower costal cartilages. A piece of the full thickness of the eighth costal cartilage, 2 inches long, including the perichondrium, was removed. The chest wound was closed with buried catgut and superficial silkworm-gut sutures, a strip of rubber-dam leading from the site of the cartilage out through the lower end of the incision. This drain was inserted to avoid oozing from a hematoma and was removed after twenty-four hours. The piece of cartilage was placed in dry sterile gauze and carefully laid aside. The nostrils were packed

with narrow strips of gauze, the skin of the nose painted with tincture of iodin and alcohol, and the face covered with a large flat sterile gauze pad with a hole cut in it through which the nose

Fig. 110.—Case I. *A*, Profile view of traumatic saddle-nose. *B*, Front view of traumatic saddle-nose before operation. *C*, Profile view after correction by insertion of costal cartilage. *D*, Front view after operation.

projected. A transverse incision ½ inch in length was made beneath the tip of the nose, and, carefully working upward with the knife and scissors, a tunnel was made from this incision to the nasofrontal suture underneath the skin of the dorsum of the

nose. With a probe, the distance from nasofrontal suture to tip was measured. The piece of costal cartilage was then shaped with a knife, being made long enough for one end to fit snugly against the frontal bone above and the other to be just covered by the skin of the tip of the nose. The ends of the cartilage were beveled so that its lower surface was convex to fit the concavity of the nasal bridge, while the upper surface remained straight. As much of the perichondrium as possible was preserved. During the trimming the cartilage was held with Allis forceps and not touched with the hands. The cartilage was then slid up into place through the incision and the latter closed with one fine dermal suture. The packing in the nostrils was removed and no dressing or external pressure of any kind applied. Recovery was uneventful, and the result was as shown in Fig. 110, *C*, *D*.

Comment.—Various substances have been used for restoring support of the nasal bridge. Foreign materials, such as paraffin, celluloid, and ivory, are mentioned only to be condemned. Bone from the tibia or rib is used by many surgeons, and a combination of rib bone and cartilage is advocated by Carter[1] and Cohen.[2] Costal cartilage is preferred by the majority, including the writer, because it is removed with comparative ease and safety, can be readily shaped to fit the case, does not undergo absorption, and is more resistant to infection than bone. A bone-graft once infected is lost, while infection of a part of the cartilage can occur and healing eventually take place. The lower costal margin is preferred, as this is below the attachment of the pleura, and full thickness can be removed without danger of opening the pleural cavity. Three routes in general have been recommended for gaining access to the dorsum of the nose, viz., incision in the nasal vestibule, the transverse glabellar incision, and skin incisions beneath the tip of the nose or through the columella. The transverse skin incision beneath the tip of the nose gives better access with less danger of infection than the intravestibular incision and leaves a practically invisible scar. In certain very marked cases better access can be obtained by a transverse glabellar incision, but this causes more hemorrhage and leaves a small scar.

Case II. Total Rhinoplasty for Syphilitic Defect.—T. S., female, aged forty-nine. Several years ago, as result of syphilis, she had ulceration of soft tissues and cartilage of nose, resulting

Fig. 111.—Case II. *A*, Front view of nasal defect involving loss of septum, columella, and most of alæ. *B*, Profile view of patient before operation. *C*, Paper and tin-foil patterns of forehead flap for fashioning new nose. Measurements plotted on paper; N–T, nasion to tip; T–L, tip to lip; B–E, greatest width between alæ; A–D, width between tops of alæ; N–B, nasion to widest point of alæ; N–A, nasion to top of alæ; A–C, height of alæ. *D*, Soft-rubber model of forehead flap, showing Blair's method of folding distal end to form columella and lining of alæ.

in deformity shown in Fig. 111, *A*, *B*. Had very thorough antisyphilitic treatment. Wassermann reaction negative. On account of the appearance the patient constantly wore a heavy

black veil over the face. The healed lesion presented complete absence of cartilaginous and bony septum, columella, tip, and most of the alæ of the nose. The remains of the nasal bones were depressed and covered with scar tissue. There was also destruction of most of the soft palate, causing speech defect. General physical condition good.

Here then was a case presenting a deficiency of all of the three essential structures of the nose—external covering, lining, and support—and each required consideration in the treatment.

A plaster-of-Paris impression of the face was taken and a cast made of the same material. Upon the plaster cast the nose was reconstructed in modeling clay, reproducing the lost feature as closely as possible. From this model measurements were accurately made and a tin-foil pattern prepared giving the exact size and shape of a forehead flap to be used in reconstruction of the nose (Fig. 111, *C*). At the first operation (April 16, 1925), under colonic ether-oil anesthesia, a flap of skin and subcutaneous tissue the size and shape of the tin-foil pattern was raised from the right side of the forehead and sutured back in place for delayed transfer to the nose.[3] Uneventful healing took place April 30, 1925, two weeks later, under colonic ether-oil anesthesia, all of the deformed remaining portions of the nose, including the scar tissue covering the nasal bones, were excised, leaving a pyriform opening with raw edges. After control of hemorrhage the forehead flap previously outlined was again raised, and sutured securely down into the nasal defect so as to restore the missing parts. The flap was so fashioned that its distal end could be folded in to form the lining of the nostrils and the columella (Fig. 111, *D*), as well as supplying the external covering of the nose, according to the plan of V. P. Blair, described in detail elsewhere.[4] Using the tin-foil pattern, a full thickness piece of skin of the exact size and shape of the forehead defect was cut from the right side of the abdomen, all adherent subcutaneous fat removed, and the graft sutured by its edges into the forehead defect. This was covered with three or four layers of gauze smeared with xeroform ointment and over all was placed a fine mesh sea sponge about 2 inches in thickness. The sponge was

secured and maintained under even pressure for six days by strips of adhesive plaster and a bandage.[5] A complete "take" of

Fig. 112.—Case II. Front view after forehead flap has been brought down to form new nose. Forehead defect covered with full-thickness skin-graft from abdomen. *B*, Profile view of same stage as in *A*. *C*, Front view, final appearance. *D*, Profile view, final appearance.

this full thickness skin-graft was obtained. Its dimensions were approximately 2½ by 3½ inches (Fig. 112, *A*, *B*).

May 19, 1925, under local anesthesia, the pedicle of the nasal flap was divided along the left border of the nose and the edges

of the flap accurately approximated and sutured to the lateral and upper skin boundaries of the nose. Part of the pedicle was returned to the forehead. Healing was complete in three weeks.

The patient was now allowed a rest. Returning after four months, it was observed that the skin-graft on the forehead was almost indistinguishable from the rest of the forehead skin, the nose was satisfactory from a cosmetic standpoint, and respiration occurred through the nostrils. However, it was noticed that a slight depression existed in the skin of the dorsum of the nose from the lower border of the nasal bones down toward the tip. October 29, 1925, under ether-oil colonic anesthesia, a piece of full thickness of the right eighth costal cartilage was removed, from which two thin narrow pieces $\frac{3}{4}$ inch long and $\frac{1}{4}$ inch wide were prepared. Through a small transverse incision just beneath the tip of the nose the skin was undermined up to the lower border of the nasal bones and a piece of cartilage placed on each side to eliminate the depression. The patient left the hospital on the sixth day, and now presents the result shown in Fig. 112, *C*, *D*.

Comment.—Much has been said and written about the necessity for using bone or cartilage in connection with the forehead flap as a support to reproduce the natural prominence of the tip of the nose. By the infolding of the distal end of the flap according to the method described to form columella and line the nostrils, in the majority of cases the natural prominence of the tip will be maintained without any additional cartilaginous or bony support. Occasionally, owing to shrinkage, there will be a slight depression over the dorsum of the new nose, where cartilage can be inserted to advantage. It is preferable to insert the cartilage beneath the skin of the new nose as a finishing touch, rather than to place it beneath the flap on the forehead before it is brought down, as it is much more easy in the former case to judge of proper size, shape, and position to be given the cartilage.

Case III. Sarcoma of Mandible.—H. W., female, aged eleven. Was first seen February 16, 1921. Her mother said she had

noticed a painless enlargement of the chin for about six months, gradually increasing in size (Fig. 113, *A*). Examination showed a rather pale, undernourished girl, with no demonstrable physical

Fig. 113.—Case III. *A*, Showing enlargement of chin before treatment. *B*, Radiograph of original condition in symphysis of mandible (Dr. L. M. Ennis). *C*, Radiograph of symphysis made in October, 1921, showing recurrence (Dr. L. M. Ennis). *D*, Radiograph made in June, 1924, showing recurrence in right premolar region (Dr. H. K. Pancoast).

abnormality except in the region of the symphysis of the mandible. There was a smooth soft bulging of the gum on the labial aspect of the lower incisor teeth. The swelling evidently came from the interior of the bone and had caused thinning or destruction

of the outer plate. The incisor teeth were all present, but were irregular and slightly loose. There was no enlargement of the submental or submaxillary lymph-nodes. Preliminary diagnosis: Either bone-cyst or sarcoma. The radiograph (Fig. 113, *B*) showed a somewhat irregularly defined area of partial bone destruction about the incisor teeth, supporting the clinical diagnosis of some form of sarcoma. The lower border of the jaw seemed to be intact.

February 18, 1921, under ether anesthesia, a conservative operation was performed. The gum on the labial surface was turned down, the incisor teeth were extracted, and the diseased soft tissue was shelled out of the bone, leaving intact the lower border of the jaw. The walls of the cavity were curetted until apparently healthy bone was reached. Iodoform packing was inserted and the wound healed in about four weeks.

Pathologic Report by Dr. E. A. Case.—Specimen consists of fragments of soft tissue and bone. Microscopically, the tumor is very cellular and hemorrhagic. The cells are round, larger than lymphocytes, and not arranged in any definite order. The nuclei stain deeply and mitotic figures are fairly numerous. Each cell has a small amount of cytoplasm. There are numerous blood-spaces or channels having tumor cells for their walls.

Diagnosis.—Round-cell sarcoma.

In view of the pathologic diagnosis, the patient was referred to Dr. H. K. Pancoast for treatment by radiation. Full dosage of radium and *x*-rays was applied.

Late in October, 1921 the patient returned for observation, and it was noticed that new growth, like granulation tissue, about the area of a dime, had appeared at the site of the original operation (Fig. 113, *C*). A second curetting operation was performed, and pathologic report of the tissue was the same as before. This operation was followed by further radiation by Dr. Pancoast. The mouth healed, and the patient remained apparently well until June, 1924, when it was noticed that the gum tissue in the right premolar region was becoming larger than normal, and a biopsy on June 6th showed recurrence of the sar-

coma. The *x*-ray (Fig. 113, *D*) indicated bone destruction about the lower right premolar teeth. It was decided then to resect completely the portion of the mandible that appeared to be involved. Before doing this Dr. Douglas Webster prepared and inserted a splint consisting of caps attached to teeth on either side of the growth, connected by a metal bar, so that after the operation the natural relationship of the remaining portions of the mandible would be maintained, and the patient could at the same time masticate food to a considerable extent. July 18, 1924, under ether anesthesia, with a Gigli saw a section of the mandible about 1 inch in length was removed from the right

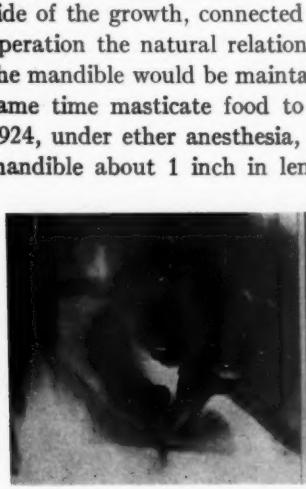

Fig. 114.—Radiograph made in October, 1925, showing defect in mandible due to removal of bone (Dr. L. M. Ennis).

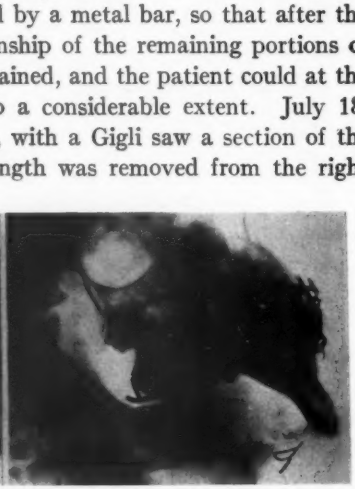

Fig. 115.—Radiograph made in November, 1925, showing bone-graft from crest of ilium in place between mandibular fragments (Dr. L. M. Ennis).

premolar region, comprising what was thought to be the diseased area and a certain amount of healthy tissue on each side (Fig. 114). The pathologic report was the same as after previous examinations. Healing was uneventful. Until October, 1925 no further growth of the tumor appeared, and the relationship of the remaining portions of the mandible with the upper jaw had been maintained by the splint. No bone regeneration having occurred, it was then decided to attempt restoration of the continuity of the lower jaw by a bone-graft. As a preliminary measure the upper and lower teeth were fastened together in their proper relationship by wire ligatures, thus fixing the fragments

of the mandible. On October 2, 1925, under colonic ether-oil anesthesia, through a curved incision in the right submaxillary region, the ends of the mandibular fragments were exposed and thoroughly freshened, and the gap bridged by a graft about 1 inch long taken from the crest of the right ilium, fixed to the mandibular fragments by means of fine silver wires passed through holes drilled in the bone. The graft was covered by a layer of deeper soft tissues sutured with catgut, and a second layer, consisting of skin. No drainage. Both the jaw wound and the hip wound healed uneventfully, and the patient was up and about without disability in two weeks. Immobilization by fixation of the lower to the upper teeth will be maintained for at least three months. Six weeks after the operation considerable firmness was noted at the site of the graft, union evidently being in progress (Fig. 115).

It is, of course, too soon to pronounce this patient cured of her sarcoma. The case is recorded chiefly to show what can be done in reconstruction after mutilating operations on the mandible, if proper provision is made from the first to preserve the relationship of the remaining parts.

For further details of indications, choice of source of graft, method and technic, see a previous article by the writer.[6]

BIBLIOGRAPHY

1. Carter, W. W.: Surgery, Gynecology, and Obstetrics, 1922, xxxiv, 800.
2. Cohen, Lee: Surgery, Gynecology, and Obstetrics, 1922, xxxiv, 794.
3. Blair, V. P.: Surgery, Gynecology, and Obstetrics, 1921, xxxiii, 261.
4. Ivy, R. H.: Jour. Amer. Med. Assoc., 1925, lxxxiv, 181.
5. Blair, V. P.: Annals of Surgery, 1924, lxxx, 298.
6. Ivy, R. H.: Annals of Surgery, 1920, lxxi, 363.

CLINIC OF DRS. EDWARD A. SCHUMANN
AND F. E. KELLER

FRANKFORD HOSPITAL

CESAREAN SECTION IN PREGNANCY COMPLICATED BY PULMONARY TUBERCULOSIS

DR. KELLER

THE case herein presented is one of pregnancy complicated by pulmonary tuberculosis:

A. L., white, married, age twenty-four, parous 7. General health good until marriage. First child instrumental delivery, also the fifth; all others spontaneous, but with labors of progressively increasing length. With the last three pregnancies through which the writer has watched the patient there has been a loss of vitality, loss of all teeth from pyorrhea, development of an endocardial murmur, which has persisted after deliveries, and the development of a persistent cough, accompanied by physical signs and positive *x*-ray findings for tuberculosis. Last menstruation January 30 to February 5, 1925.

In the face of the above outlined conditions, after consulting with both the husband and wife, it was decided to deliver the child without subjecting the mother to the strain of labor, and to ligate the tubes.

Case admitted October 26th, 10.00 A. M.; laboratory tests made and sedatives administered for the cough, which was very annoying. No laxatives or enemata given, and full diet allowed the night before the operation. October 28th, 8.30 A. M., hypodermic of morphin sulphate, gr. $\frac{1}{6}$, and scopolamin hydrobromid, gr. $\frac{1}{100}$, was given, and the operation started at 9.30 A. M., iodin and alcohol preparation of the skin being used. The skin was infiltrated for a length of about 6 inches, slightly to the left of

the midline, extending 3 inches above and 3 inches below the umbilicus, with ½ per cent. novocain solution. Incision of the abdominal wall was made, and a traction suture of catgut passed into the uterine muscle at the upper end of the incision. Below this the uterus was incised, care being taken that the uterus was held up against the abdominal wall. After extracting the child, placenta, and membranes, the uterus was sutured with three layers of No. 2 chromic catgut continuously. Torsion of the uterus in order to make the tubes accessible for ligation was the only step in the operation causing the patient pain. The tubes were then separately infiltrated, ligated doubly, and sectioned between ligatures. Closure of the abdomen with three continuous layers of chromic catgut sutures and application of dressings found the patient resting very quietly, with a pulse of 86. The child, a male, cried as soon as delivered and seemed healthy.

MULTINODULAR FIBROID TUMOR COMPLICATED BY SALPINGITIS

DR. SCHUMANN

The patient is a negress, thirty-four years of age, nulliparous, who has noticed the presence of an abdominal mass for several years. Within the past year it has grown rapidly in size, and now causes her some discomfort by reason of its weight. She has had some menorrhagia for the past year, but the menstrual disability has never been marked. There has been a little dull pain in both iliac fossæ for about one year. Blood and urine are negative, as is her Wassermann reaction. When the abdomen is bared, a large irregular tumor is clearly seen, extending midway between the umbilicus and the ensiform and presenting several nodules of various sizes. Under ether anesthesia the abdomen is cleansed with McDonald's solution (phenoco, 3; acetone, 40; alcohol, to 100), and through a long midline incision the tumor is exposed. It proves to be an immense fibroma with many various sized nodules, one of which extends far out into the right broad ligament. Both tubes are the seat of a chronic salpingitis, densely adherent to the uterine tumor and to the sigmoid, and the

ovaries are buried in adhesions. A difficult and bloody supravaginal hysterectomy is performed, both tubes and ovaries being removed and the abdomen closed without drainage.

Subsequent Course.—Convalescence was uneventful and afebrile, patient leaving the hospital in fourteen days.

The above case brings out two points for debate: first, What determines the choice of operation over radium treatment? and second, Why a supravaginal hysterectomy rather than a panhysterectomy?

The tumor was very large and composed of many subserous nodules; hence the most unfavorable form of fibroid for radium treatment. Furthermore, there was a marked associated salpingitis which, to my mind, is a positive contraindication to the use of radium. Second, as to the type of operation: In this clinic panhysterectomy as compared with supravaginal amputation is bloody, difficult, and dangerous. I believe that very few malignancies develop in the remaining cervical portion of the uterus when one considers the number of supravaginal hysterectomies annually performed, and I also believe that the cervix and its parametrium offer a most important support to the vagina. Hence the choice of procedure.

ECTOPIC PREGNANCY

The third case, by Dr. Schumann, is a woman thirty-four years of age, who has had two normal pregnancies, and one month ago she was said to have suffered a miscarriage. There is an indefinite history that a fetus and its membranes were passed. On examination the birth canal is parous, the cervix is soft, the uterus is soft and boggy, and there is a vague sensation of resistance in the culdesac. From the history and the findings a tentative diagnosis of ectopic pregnancy was made and laparotomy performed.

Ether anesthesia was used. When the peritoneum was opened a large amount of old blood-clot escaped, confirming the diagnosis. The uterus was somewhat subinvoluted; the left tube and ovary were normal; the right tube was buried in adhesions

and was enlarged to 4 cm., and in its diameter contained a dead ovum with hemorrhage into the sac. There had been a partial tubal abortion with no evidence of rupture of the tube, but with masses of organized blood-clot extruding from the fimbriated extremity. The ovary was buried in adhesions and, together with the tube, it is removed. The left tube and ovary being normal to gross inspection, they are allowed to remain, since statistics show conclusively that though ectopic pregnancy does develop in the remaining tube, normal intra-uterine pregnancy in these patients exceeds ectopic in a ratio of about 4 to 1.

This case is interesting especially by reason of the fairly definite history of abortion, which is probably erroneous. Combined tubal and intra-uterine pregnancy does exist, but the condition is comparatively rare, and one is not justified in concluding that such multiple lesion was present without definite evidence as to the abortion of an intra-uterine fetus.

Subsequent Note.—This patient made an afebrile and uneventful convalescence, being discharged from the hospital on the twelfth day.

CLINIC OF DR. EDWARD A. SCHUMANN

PHILADELPHIA GENERAL HOSPITAL

CHRONIC SALPINGITIS

THE case selected for this clinic is one of old chronic salpingitis of gonorrheal origin, occurring in a negress of forty-two, and associated with generalized and very dense abdominal adhesions. This particular type of case gives rise to the greatest technical difficulties at operation, since there is much likelihood of severe damage to the intestine and of resistant hemorrhage. The anesthesia chosen is nitrous oxid oxygen, which is administered by Dr. McKesson, of Toledo, who took this opportunity to demonstrate his improved apparatus for the introduction of nitrous oxid anesthesia. The patient took the anesthetic badly, relaxation being difficult to obtain. On opening the abdomen the condition known as frozen pelvis presents itself. Coil after coil of intestine is densely glued together by old firm adhesions between the bowel and the pelvic organs. After a prolonged dissection (and here I feel that sharp dissection should be practised whenever possible) the intestine was freed, with several areas of denudation of the serous coat, which were immediately repaired by Lembert's sutures and No. 00 catgut. The tubes were found to be the seat of a typical old purulent salpingitis firmly fastened in the culdesac. Their separation left a large area of raw and bleeding tissue over the rectum. By reason of the great oozing and of the amount of trauma required, this patient was not subjected to hysterectomy, but both tubes and ovaries were removed and the uterus attached to the anterior abdominal wall by ventrofixation. This is not a procedure of choice, but I believe that undue traumatism should never be practised, and that an incomplete operation with the patient leaving the table in

good condition is better than a thorough removal of all pathologic structures to the detriment of the patient's immediate condition. Gauze drainage into the culdesac was instituted in this case, since it was entirely impossible to peritonealize the raw surfaces and control the capillary ooze.

Subsequent Note.—The patient made a somewhat stormy convalescence; drainage was removed in four days, and she left the hospital, with the abdominal incision healed and symptom free, in twenty-four days.

CLINIC OF DR. BASIL R. BELTRAN

MISERICORDIA HOSPITAL

GUNSHOT WOUND OF THE LIVER, STOMACH, PANCREAS, AND INTESTINES, WITH RECOVERY

MASTER C. D., an Italian boy aged fourteen, was admitted to the accident ward about 10.30 A. M. October 28, 1925 because of a gunshot wound of the abdomen and right elbow, accidentally inflicted while playing with his companions. The injury occurred about 9.30 A. M.

The patient's face is rather anxious. Pulse 90, temperature subnormal. Blood-pressure, systolic 110 mm. Hg., diastolic 65 mm. Hg. His chief complaint was marked pain of the upper part of the abdomen.

There is a through-and-through gunshot wound of the right elbow about 1 inch above the olecranon and posterior to the humerus. This wound is on the level with the abdominal one, located slightly below the right costal margin in the mammary line. There is no abdominal wound of exit. No nerve involvement of the arm or forearm. No abdominal distention was present. Marked rigidity, especially of upper half of abdomen. Though the appearance was present, the actual state of shock was absent. Consequently, we felt justified in knowing the whereabouts of the bullet.

x-Ray of the abdomen and thorax revealed a "bullet of large caliber situated on a level with, and to the inner side of, the crest of the ilium on the left side" prior to laparotomy.

Shortly prior to the operation the boy vomited dark brown material. The patient was operated upon one hour and a half after admission.

Operation.—Under ether anesthesia an incision over the right rectus muscle, upper section, was made; the rectus was

retracted outward. On reaching the peritoneum a bulging thereof was noted, indicating gas. On opening the peritoneum this suspicion was confirmed. A moderate amount of free blood was present, also numerous clots. No gastric or intestinal contents noted. A wound of the outer side of the right lobe of the liver was present; another of the liver slightly to the inner side of the sigmoid section of the gall-bladder. There was no unusual amount of hemorrhage from the wounds. There was a perforation in the anterior wall of the stomach about its middle; also one of the transverse colon near the gastrocolic omental attachment, proximal to the splenic flexure; another of the transverse colon below and above. A section of small intestine was found slightly contused. On searching for other intestinal wounds, the bullet—32 caliber—was found free in the left iliac fossa. The transverse mesocolon was then opened in an effort to reach the posterior wall of the stomach so as to explore it and the contents of the lesser peritoneal cavity. With great difficulty the stomach was delivered and a wound found slightly below the lesser curvature about the junction of the proximal and distal third. Examination of the immediate area about the posterior gastric wound revealed also a wound of the body of the pancreas. Slight hemorrhage of the said organ was controlled by packing with plain 2-inch strip gauze. The operative wound in the transverse mesocolon was closed. A drain from the pancreas was brought out through an opening in the gastrocolic omentum. The left kidney pouch was drained through the same opening by a cigarette drain. Lambert interrupted sutures of fine silk were used in all perforations. The rectus sheath and peritoneum was sutured with through-and-through catgut No. 2, equisitine used for the skin. During the operation 500 c.c. of normal saline solution was given. The patient left the operating table with a pulse of 148. Time of operation one hour and fifteen minutes.

Postoperative Progress.—Under continuous hypodermoclysis of normal saline and enteroclysis of sodium bicarbonate the patient reacted slowly. No emesis. Eight hours following the operation 300 c.c. of citrated blood was transfused, with no

reaction therefrom. On the second day the patient was in poor condition. Pulse between 144 and 160. There was marked abdominal distention. The patient expelled flatus and defecated, the feces being slightly blood-stained. There was no vomiting. Considerable epigastric pain was experienced. Patient was slightly irrational and very restless. On the third day he still complained of a great amount of epigastric pain and distention was still present. It was therefore deemed advisable to perform gastric lavage. On insertion of the tube a great quantity of gas was released. Gastric contents were slightly greenish. Following this he seemed greatly relieved, both pain and distention being decidedly less. The patient, however, was slightly toxic, pulse between 110 and 130. Drainage from the upper end of the abdominal wound was of a dark grayish color and rather thick, remaining so for approximately sixteen days, when the drainage gradually lessened. The drain in the kidney pouch was removed on the seventh day; following this the drain from the pancreatic area was withdrawn slowly each day until the twelfth day, when the drain was removed in its entirety. Approximately 15 inches of packing was used. From then on the patient improved fairly rapidly, no gastric disturbance being noted. The bowels moved regularly and micturition was normal. No thoracic complications occurred. Nine days after operation an examination for blood-sugar showed only a slight increase. Earlier examinations were not made because of the apparent hopelessness of the case as revealed at the time of the operation and the stormy immediate postoperative condition. Patient was allowed out of bed at the beginning of the fifth week (December 4th) and discharged from the hospital December 20, 1925.

The boy was last seen on January 9, 1926; the wound had practically healed except for a granulating area about 2 cm. in diameter at the upper angle of the wound. There was no abdominal distention. Bowels regular. Appetite was good. He enjoys playing about with his companions. The gunshot wound of the arm has healed without complication, there being present for a few days a slight disturbance along the distribution of the

ulnar nerve, which gradually cleared as the inflammation subsided.

This case is interesting because of the transit of the bullet and the multitudinous complications that may ensue in this section of the upper abdomen when trauma disturbs its equilibrium.

The possibility of injury to the pancreas must always be thought of even when the posterior wall of the stomach is not involved. Ample drainage of the pancreas must be provided by the most accessible route, and maintained sufficiently long enough to provide an exit for the fluid that would otherwise cause such extensive necrosis, if not the sacrifice of life.

STRANGULATED HERNIA IN AN INFANT NINETEEN DAYS OLD—WITH RECOVERY

Male infant nineteen days old; admitted to the hospital September 8, 1925, with a note from the attending physician, who had also delivered the child, stating that the infant had either a scrotal hernia or a hydrocele. No complications attended the birth of the infant, no forceps being used, no anesthesia having been given the mother. The child was well developed, weighing 9 pounds, 12 ounces at birth and presenting no abnormalities. The mother alone nursed the child, whose digestion and assimilation were evidenced by gain in weight, normal defecation, and micturition. The mother had 2 previous children, the younger a boy recently operated upon for a right inguinal hernia.

On the morning of the child's seventeenth day the mother noted that he was rather reluctant to the taking of food. Several times the milk regurgitated. The frequency and quantity of defecation lessened. No bowel movement or micturition was observed the afternoon of the eighteenth day; the vomitus consisted of milk curds slightly greenish in color. The mother later that afternoon gave the patient 1 dram of castor oil, followed shortly by an "injection" (enema). No defecation resulted; urinated slightly. The child was very restless throughout the evening and night, crying frequently and refusing the breast.

The mother, seeing that the infant's symptoms were decidedly worse the morning of the nineteenth day, as evidenced by greenish vomiting, lack of defecation, urination, and the appearance of a "lump" in the left groin, sent for her physician, who advised transference of the case to the hospital. Reluctantly she brought the child to the hospital that evening.

When seen shortly after admission the infant appeared greatly toxic. There was a marked restlessness accompanied by greenish vomitus, marked abdominal distention, and a scrotal swelling about the size of a large English walnut (5 cm.). The mass was bluish, doughy, and well circumscribed, the upper margin ending abruptly at the inguinal ring. Considering the above characteristics and history, no attempt was made to perform taxis, but immediate operation was decided upon.

An incision over the left scrotal and inguinal regions was made under local infiltration anesthesia (novocain 0.5 and adrenalin 0.25). As the periperitoneal structures were cut through the tense congested gut was almost distinctly visualized. With great difficulty the fibrous external inguinal ring was incised. Immediately the scrotal peritoneum tore through, due to the distended small intestine. Then, owing to the infant's constant straining, about 7 cm. of the normal gut escaped through the opening. The sac contained about 5 cm. of livid small intestine. The glistening surface was faintly apparent. Following the application of warm compresses, evidence of returning circulation became marked. Repeated efforts to now reduce the intestines were futile, so for a few minutes—which included tying of the peritoneal sac and reduction of the intestines—ether was administered. Owing to the great amount of surrounding edema and delicateness of the tissues it was with difficulty that a successful attempt was made to partially close the canal by using chromic catgut No. 0. The cord was spared and was not transplanted. Interrupted sutures of fine equisitine were used for the skin. An alcohol dressing and spica of the groin was then applied. The time of operation including infiltration was thirty-five minutes. Though the pulse was imperceptible and respiration exceedingly rapid the infant was but slightly cyanotic

when leaving the table. Other than warmth and water no shock measures were instituted. The following morning, five hours after operation, and again seven hours after operation, the infant had copious bowel movements of dark brown fluid. Defecation then progressed at irregular intervals, allowing the child to return to normalcy. The mother was allowed to nurse the baby eighteen hours after operation. The wound healed by primary intention. Convalescence was rapid. No complications ensued. The patient left the hospital twelve days after admission.

In this infant the strangulation lasted thirty-six hours or more. Operation was done with one motive in view—that of saving the life of the patient—all other maneuvers being secondary.

The case demonstrates the necessity for leaving no stone unturned in seeking the etiology of the various conditions that cause gastric intestinal disturbances in children, the mechanical impediment by no means being rare.

With a condition of this kind there are a few stumbling-blocks along the diagnostic way, the more common being an ectopic testicle, a hydrocele, and an inguinal adenitis. A hydrocele may be eliminated by the serious aspect of the rapidly increasing symptoms in strangulation. Transillumination should never be considered, for hernia in early infancy may be translucent. Inguinal adenitis if unilateral is nearly always a secondary condition; hence we look for abrasions or contusions on the side involved. If bilateral, then the child may be the victim of general adenopathy, the result of heredity.

ACUTE PERFORATION OF A DUODENAL ULCER

The patient, H. C. V., aged fifty-five, was admitted to the hospital July 15, 1925, with a moderate amount of pain in the epigastrium and marked pain in the right iliac region. On the day of admission, while sitting at the breakfast table, he was suddenly seized with very severe pain in the epigastrium. He went to bed and called his physician. There was no vomiting at this time.

Later in the day the pain in the epigastrium subsided and became more marked in the right iliac and the right lateral lumbar region. He was seen by his brother-in-law, a physician, that evening, and sent to the hospital. The patient had always enjoyed good health and at no previous time had suffered any gastric disturbance.

On admission the physical examination showed a thin white male somewhat weatherbeaten, apparently older than his age, suffering great pain in the right iliac region. There was no cyanosis; no jaundice; slight dyspnea; no abdominal distention. There was marked abdominal rigidity, especially in the right middle and lower abdomen. Pulse 108 and temperature 100° F. The blood-pressure 140 mm. Hg. over 100 mm. of Hg. Hemoglobin, 93 per cent.; erythrocytes, 4,820,000; leukocytes, 11,500. Urine negative.

The unquestionable signs of an acute abdominal condition made us decide on immediate operation. The diagnosis based on the symptoms of appendicitis was made.

Operation.—Under novocain, ½ per cent., adrenalin, ¼ per cent., and nitrous oxid-oxygen anesthesia, a right upper rectus incision was made slightly below the level of the umbilicus. The rectus muscle was split. On opening the peritoneum turbid fluid was encountered. The appendix was found to be normal. Approximately 2 ounces of turbid fluid was found in the pelvis. This naturally made us seek elsewhere for the cause of the abdominal distress. A moderate amount of congestion was noted between the cecum, the outer abdominal wall, and the ascending and hepatic section of the transverse colon. Lymph-plasma was noted about the upper anterior section of the duodenum, slightly beyond the pyloric region. On manipulating this, a perforation about 1/10 cm. in diameter was discovered with a small amount of bile exuding therefrom. A slight induration was noted about the perforation. No clinical evidence of malignancy present. A double row of Lambert sutures occluded the opening. A small piece of great omentum was transplanted over the line of suture. A cigarette drain was inserted into the right kidney pouch and in the pelvis. Because of the presence

of beginning peritonitis and the general condition of the patient it was not deemed advisable to do a posterior gastro-enterostomy. Time of operation, including infiltration anesthesia, one hour and twenty minutes.

Postoperative Program.—Culture from turbid fluid found in the pelvis showed no growth after forty-eight hours. Under continuous hypodermoclysis of normal saline and enteroclysis of 5 per cent. each soda bicarbonate and glucose, the patient reacted well. There was no postoperative vomiting. He developed a slight cough which was controlled by morphin. The chest was negative throughout the convalescence. Drainage of sero-sanguineous fluid was rather free for approximately five days. Following the removal of the drains the discharge rapidly lessened. The patient gradually improved, leaving the hospital four weeks after operation. He had a slight discharge for about six weeks after leaving the hospital, when his wound healed. He is now on a modified diet and has gained weight. No gastric disturbance has occurred since operation.

ACUTE PERFORATION OF A GASTRIC ULCER

This patient, a white boy, V. McD., eighteen years of age, was admitted to the hospital at 9.30 P. M., October 7, 1925, with the chief complaint of marked pain in the right lower abdomen. About 5 P. M., on the day of admission, he developed pain in the right lower abdomen. This occurred while the patient was at work. Arriving at his home the pain became progressively worse until 6.30 P. M., when he was "doubled up" because of the agony. About this time he vomited some slightly greenish material. No bowel movement since the day previous to admission. He has had occasional pains, which he described as mild cramps, always to the right of the umbilicus and above the right iliac region, but these were never accompanied by vomiting. He attributes these pains to the fact that he is a shoe-fitter and constantly leans over at his work. His appetite has always been good. No history of indigestion, although he occasionally had eructations. He has been habitually constipated. No cough. No loss of weight; no dyspnea; no urinary symptoms. Family

history was negative and his past medical history had no bearing on the present condition.

On admission to the hospital physical examination showed a well-developed white boy, eighteen years of age, apparently in great pain; face is flushed and anxious; there is marked rigidity and pain of the abdomen, especially to the right of the umbilicus and in the vicinity of the right iliac fossa. No distention. Temperature, 99° F.; pulse, 99; hemoglobin, 90; erythrocytes, 4,450,000, and leukocytes, 15,100. Blood-pressure, systolic 122, diastolic 78.

Because of the acute symptoms a preoperative diagnosis of acute appendicitis was made.

Operation.—Under novocain, ½ per cent., adrenalin, ¼ per cent., infiltration anesthesia with nitrous oxid-oxygen, a right rectus incision slightly below the umbilicus was made. Rectus retracted inward. On opening the peritoneum, slightly turbid fluid without odor was encountered. The cecum was slightly injected, also the appendix. There was no injection of the meso-appendix. Because of the congestion of the appendix an appendectomy was performed. A small amount of turbid fluid was found in the pelvis. The condition of the appendix did not warrant the character of the fluid present in the abdominal cavity and, consequently, we explored the upper abdomen by enlarging the incision. Our efforts were rewarded by the finding of plastic lymph on the gastric side of the pyloric ring near the lesser curvature of the stomach; in the midst of the exudate a small perforation about 0.1 cm. was found slightly below the attachment of the gastrohepatic omentum, about 4 cm. from the pyloric ring. No gastric contents but mucus found about the perforation. A double row of Lembert sutures of silk were used, and caused the ulcer, which was not indurated, to be buried. A transplant of great omentum was placed over the ulcer-bearing area. Because of the position and size of the ulcer and lack of pyloric obstruction a gastro-enterostomy was not performed.

A cigarette drain was placed in the right kidney pouch. Patient left the operating room in good condition. Pulse was 110. Duration of operation fifty-five minutes.

Postoperative Progress.—His convalescence was devoid of all complications. He experienced no postoperative vomiting. Drain was removed on the second day and the wound healed by primary intention. Patient was discharged from the hospital October 28, 1925, twenty-one days after operation.

These 2 cases are interesting because, in the clinically allied condition of the marked disparity of ages, one fifty-five, the other eighteen, there is absence of the symptoms and physical signs of the strictly classical text-book picture of perforation either of the duodenum or stomach. It demonstrates the necessity and the reward gained by early operative interference in the presence of an acute abdomen. No one has difficulty in detecting the presence of peritonitis. It should be our aim always to discover at the moment of its occurrence the etiology. Moreover, when acute symptoms and signs are present, and on intra-abdominal inspection pathology of the suspected organ is not present, let us not be timid about seeking with all speed for other causes so as to prevent a postoperative catastrophe.

CLINIC OF DR. LOUIS H. CLERF

From the Chevalier Jackson Bronchoscopic Clinic,
Jefferson Hospital

CICATRICIAL STENOSIS OF THE ESOPHAGUS

In the management of patients with cicatricial stenosis of the esophagus no one plan of treatment will successfully meet the requirements in every case. Ultimate cure, however, is dependent on several factors which we believe to be paramount in the treatment, namely, performing gastrostomy if the dysphagia is sufficient to interfere with proper and adequate alimentation, and the utilizing of some method of dilatation which is, at the same time, safe and effective. Obviously, one must be certain that the stenosis of the esophagus is cicatricial in character. This can be positively ascertained by studying the swallowing function by fluoroscopy with a radiopaque substance in solution or in capsule, and by Roentgen-ray examination of the chest. Following this study, esophagoscopy should be done. Diagnostic methods which are dependent on inferential conclusions cannot always differentiate between aneurysmal compression, malignancy, cicatricial stenosis, and other forms of esophageal disease.

The most common cause of cicatricial stenosis in the large number of little children brought to the Bronchoscopic Clinic is the accidental ingestion of lye. These cases are often brought to the clinic markedly emaciated and unable to swallow even water, being practically dehydrated from water starvation.

Case I. Extensive Lye Burn of Esophagus.—This little child, aged two years, was brought to the Bronchoscopic Clinic this morning practically *in extremis*. He has been unable to

swallow anything, even his own saliva, for the past four days. The history states that four months ago he drank some water from a "Banner" lye can that had been left standing on a window-sill and was believed to be empty. There was immediate vomiting and retching, but all to no avail, for the caustic alkali devitalized the tissues as soon as it came in contact with them. Following the accident the patient had great difficulty in swallowing anything, even water, but as the ulcers healed swallowing

Fig. 116.—A child, aged two years, with complete closure of the esophagus due to the accidental swallowing of lye. There has been marked weight loss from the progressive starvation and he has been unable to swallow anything for the past four days, so that he is now in a semicomatose state. Fluids are being introduced by proctoclysis and hypodermoclysis and a gastrostomy will be performed as soon as his tissues react from the marked dehydration.

improved somewhat, and for about two months he was able to swallow small amounts of soft food without difficulty. This, however, was only of brief duration, and the swallowing became slowly but progressively more difficult, until only water could be swallowed, and this up to four days ago. There was very rapid weight loss, the skin became dry, the eyeballs were sunken, and since yesterday he has been in a semiconscious state, moving only when aroused, as you observe him now (Fig. 116).

On admission of such a case immediately there arises this question. What shall we do for the patient? The esophagus in this case is completely closed, as there has been regurgitation of all foods taken during the past four days. Dr. Willis F. Manges has ruled out an opaque foreign body in the esophagus by

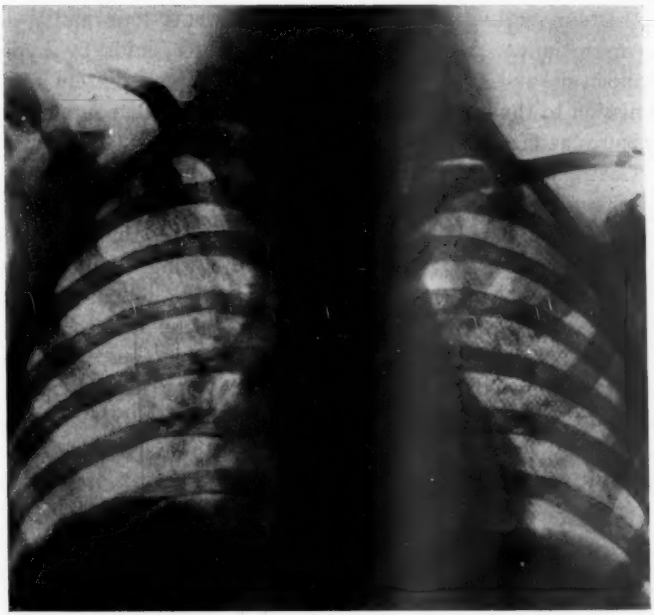

Fig. 117.—Roengtenogram made by Dr. W. F. Manges in the case of the patient shown in Fig. 116. The bismuth subnitrate mixture is shown in the upper esophagus. Dr. Manges reported that there was practically complete stenosis of the esophagus with marked dilatation of the portion proximal to the closed lumen.

Roentgen-ray examination, and reports that the swallowed bismuth subnitrate mixture did not pass beyond a point opposite the level of the tracheal bifurcation (Fig. 117). Would it be advisable to pass an esophagoscope to open the esophagus so that fluids could be again introduced into the stomach through the natural passages? Absolutely no! Any form of esophageal

dilatation is contraindicated at this time. The outstanding need now is *not* dilatation of the esophagus, but supplying the dried tissues with water, and that without delay. Should gastrostomy be done immediately? We have already consulted with Dr. T. A. Shallow, and he will do a gastrostomy as soon as the patient has received sufficient fluids and has reacted. The gastrostomy will be done within the next twenty-four hours. In the meantime we shall continue to introduce fluids by hypodermoclysis and proctoclysis, as was done immediately after admission to the hospital, and to resort to such other supportive measures as may be indicated.

Gastrostomy will fulfil the first indication in the treatment of this case, that is, it will provide an avenue for the introduction of sufficient fluids and food. In addition, it places the esophagus at rest, preventing static esophagitis and allowing the ulceration to heal, and, what is equally important, it will allow us to carry out dilatation by retrograde bouginage, using the Tucker bougie. In the absence of an opaque foreign body obstructing the esophagus we believe that diagnostic esophagoscopy should be delayed until after gastrostomy has been done. As soon as the gastrostomy wound is well healed we will do a diagnostic esophagoscopy, and then will start with the dilatation of the esophagus.

Difficulty may be met with in stringing the patient because of the present atresia of the esophagus. If, after a period of rest, the esophagus does not open sufficiently to allow a fine thread to be swallowed, then it will be necessary to utilize retrograde esophagoscopic bouginage for the placing of the string as described elsewhere by the author. If there is atresia resulting from cicatrization of the esophagus, the method devised by Chevalier Jackson for the penetration of the cicatricial barrier by combined peroral and retrograde esophagoscopy under the direction of a double-planned fluoroscope must be resorted to.

The prognosis as regards ultimate cure of the stenosis in this case is good provided there has not been too extensive damage to the kidneys. Occasionally one sees these unfortunates whose tissues are so damaged by the long-continued water starvation

that fluids introduced by bowel and under the skin will not be taken up.

Case II. Cicatricial Stenosis of the Esophagus Complicating Lues and Requiring Gastrostomy.—This patient, a man aged thirty-four years, came into the clinic with a history of difficulty in swallowing of seven months' duration. In questioning him we were unable to elicit a history of the swallowing of any caustics, acids, hot fluids, or other irritants. However, it was learned that at the onset of the dysphagia a Wassermann test made of the blood was positive, 4 plus, and that he had received a brief course of antiluetic treatment.

The difficulty in swallowing was quite marked, in fact, there were times when the esophagus was completely obstructed, due very probably to the lodgment of food particles, and, as a result, he had lost 52 pounds in weight.

Roentgen-ray studies of the esophagus by Dr. John T. Farrell, Jr., showed a narrow stricture of the esophagus with dilatation of the proximal portion (Fig. 118). At esophagoscopy there was found a tight stenosis of the esophagus at a point 27 cm. from the upper teeth. The mucosa was very inflammatory, with marked evidences of extensive chronic esophagitis, the result of stasis with coincident fermentative and putrefactive changes in the retained food. With the marked dysphagia, the extensive stenosis of the esophagus, and the chronic esophagitis we believed that gastrostomy should be done without delay, and this was performed by Dr. J. H. Gibbon under local anesthesia. As soon as the gastrostomy wound had sufficiently healed, attempts were made to have the patient swallow a string; these, however, were unsuccessful because the esophagus was practically atresic, and it became necessary to resort to retrograde esophagoscopic bouginage for the placing of the string. In doing this the bougie is carried gently upward in the retrograde esophagoscope through the strictured esophageal lumen until its free end reaches the pharynx. This is recovered through the mouth and a light silk thread is attached to it. The bougie is then withdrawn through the esophagoscope, carrying with it

Fig. 118.—Roentgenogram showing extensive stenosis of almost the entire thoracic esophagus in the case of a man aged thirty-four years who gives a history of a luetic infection. There is marked dilatation of the esophagus proximal to the strictured lumen. Films by Dr. John T. Farrel, Jr.

the attached thread, which is, in turn, replaced by a heavy silk string. Retrograde bouginage has been carried out twice weekly, and now a size No. 28 (French scale) bougie can be drawn up

without encountering much resistance. As soon as a size No. 30 (French scale) bougie can be readily drawn up the patient will be taught to *swallow* a silk woven bougie, beginning with size No. 30 and increasing this progressively until a size No. 40 can be swallowed without difficulty. It will be necessary to continue this practice for a considerable period of time, since it has been shown that strictures of luetic origin exhibit an unusual and persisting tendency to contract. Antiluetic treatment has been carried out, and, although the Wassermann test has remained negative, we believe that this stricture was luetic in origin.

Here again is a case of esophageal stenosis in which gastrostomy was definitely indicated.

Case III. Lye Burn of the Esophagus. Gastrostomy Not Required.—This patient, aged sixty years, whom you observed walking into the operating room, is very well nourished and appears to be perfectly well. Five months ago she accidently drank a solution of Red Seal Lye which had been strained and put into a medicine glass, it being her intention to use this for cleaning a sink. Unfortunately for the patient this medicine glass was mistaken for another containing medicine, and the contents of the wrong glass were swallowed. Marked dysphagia immediately followed and the patient was unable to take anything but liquids and very soft articles of food.

On admission to the Bronchoscopic Clinic she had lost considerable weight and could swallow only liquids without difficulty. Very soft foods when swallowed would often lodge for a time, producing complete esophageal obstruction. Roentgen-ray study by Dr. Manges revealed moderate obstruction of the esophagus slightly above the level of the suprasternal notch and a second obstruction at a point about 8 cm. above the hiatus esophagus. Diagnostic esophagoscopy was done, which revealed ulceration at the level of the cricopharyngeus and a marked degree of cicatricial stenosis with extensive scarring of the esophageal wall immediately below the ulcerated area. Believing that the esophageal lumen, although greatly narrowed,

was still of sufficient caliber to allow the passage of an adequate quantity of fluid food for the proper maintenance of the patient's nutrition, it was decided not to advise gastrostomy and to commence dilatation of the esophagus. Peroral esophagoscopic bouginage was instituted, being performed at weekly intervals without anesthesia, local or general. The stricture at the level of the cricopharyngeus was rapidly dilated, and after about two months a 5-mm. full lumen esophagoscope was carried through its lumen and dilatation of the lowermost stricture was started. Dilatation of the strictures has been continued and today I shall pass an 8-mm. full lumen esophagoscope. The patient has not received a sedative, nor has any anesthetic been used. The esophagoscope is carried through the uppermost strictured area without difficulty. The lowermost stricture will not admit this esophagoscope, therefore dilatation will be carried out by using the flexible tipped, steel stemmed, Jackson bougies which are passed through the stricture under direct visual guidance.

This is the type of case that can be treated by peroral esophagoscopic bouginage alone. The strictured lumen was sufficiently large to allow the passage of an adequate quantity of food for the maintenance of the patient's nutrition. Therefore gastrostomy was not done.

Gastrostomy is not indicated in every case of cicatricial stenosis of the esophagus. The condition of the patient's nutrition, the ability to swallow sufficient food, and the degree and extent of the esophageal injury are determining factors.

Gastrostomy is not without an operative mortality, especially in children devitalized by prolonged water starvation. Certainly in these same patients blind methods of dilatation cannot be less dangerous.

In gastrostomized patients the most effective and safest method of treatment is retrograde bouginage, using the Tucker bougie.

BRONCHOSCOPIC AIDS IN THORACIC SURGERY

After observing the uniformly good results obtained by bronchoscopy in the group of patients just shown you, one might gain the impression that bronchoscopic aspiration combined with endobronchial medication was the method of choice in the treatment of lung suppuration.

Before arriving at conclusions regarding the best form of treatment it must be recalled that these cases are all of recent origin. All, save two, followed the removal of tonsils under general anesthesia, the exceptions being a case of lung abscess following appendectomy under ether anesthesia, and an abscess complicating lobar pneumonia. The abscesses involved but one lobe and with two exceptions this was either the right or left upper lobe. The exceptions noted were one right lower lobe case and one abscess involving the middle lobe. These considerations regarding the duration of the disease, the extent of the diseased process, and its location have a profound influence upon not only the ultimate outcome but also the form of treatment to be advised in any case.

The internist, because of his broader viewpoint and his more thorough knowledge of the requirements, in any case is better qualified than the bronchoscopist to determine if bronchoscopy is useful in suppuration and whether or not it is indicated in a given case.

In cases of long duration with extensive bronchial dilatation and fibrosis or large abscessed cavities peripherally situated in the lung tissue the question of treatment is often a perplexing one. There is usually a history of prolonged medical treatment combined with rest in bed and postural drainage, with little or no ultimate beneficial results so far as cough and amount of expectoration are concerned. Such cases usually are referred to the surgeon or to the bronchoscopist for the relief of their symptoms. The case which I shall now show you belongs to this group.

Case I.—This girl, aged seventeen years, was referred to the Bronchoscopic Clinic, Jefferson Hospital, by Dr. C. D. Smith

because of lung suppuration involving the right lower lobe which did not respond to the usual measures employed in the treatment of these cases. The patient does not recall when the cough and expectoration began, but one gains the impression that it has been of long duration. On admission she weighed but 90½ pounds; there was frequent cough with a profuse expectoration

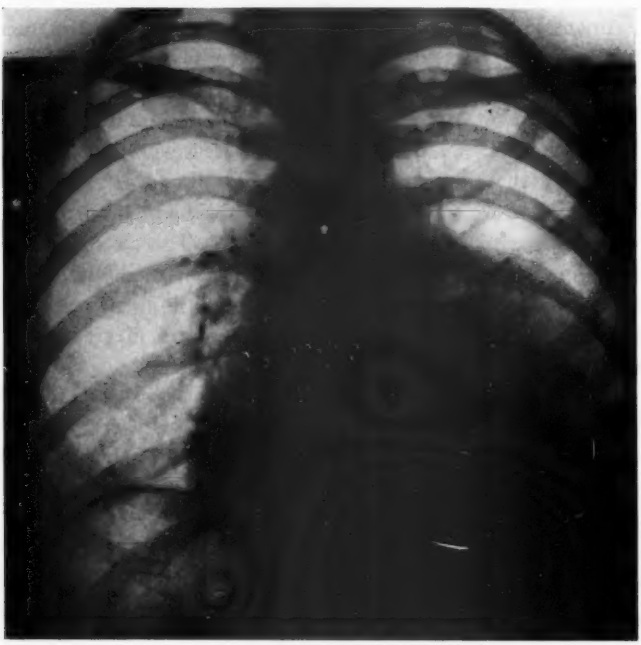

Fig. 119.—Roentgenogram made by Dr. W. F. Manges was reported by him as showing an extensive pathologic process in the right lower lobe with extensive fibrosis and displacement of the heart to the right side.

varying from 40 to 90 c.c. daily. The sputum was thick, purulent, and of fetid odor; in fact, this was so marked that the patient had been unable to continue with her schooling. On physical examination there was found extensive pathology limited to the right lower lobe. The heart was displaced to the right side. The inference was that there was extensive fibrosis with sup-

puration involving the right lower lobe. Roentgen-ray studies of the chest were made by Dr. W. F. Manges, who corroborated the above findings (Fig. 119).

The question of surgical intervention had been considered by Dr. Smith, but he believed it inadvisable because of the patient's poor physical condition. Diagnostic bronchoscopy was advised, and this was done. The diagnosis of extensive lung suppuration with bronchial dilatation involving the right lower lobe bronchus was made. Weekly bronchoscopic treatments, consisting of bronchoscopic aspiration of the pus with endobronchial medication, were instituted, and it was observed very shortly after that the cough and the amount of expectoration decreased and the fetid odor of the sputum completely disappeared.

To determine the degree and character of the involvement of the right lower lobe bronchus, pneumonography was done. Dr. Manges reported that there was marked contraction of the entire right lower lobe with marked dilatation of the bronchi even down to the terminal ends and with little parenchymal tissue remaining. Bronchoscopic treatment was continued at weekly intervals and today the patient shows the result obtained. She has gained in weight and feels perfectly well except for the occasional cough and the expectoration of about 10 c.c. of sputum daily. She has returned to school and no longer worries about profuse fetid sputum and foul breath. A very happy situation indeed were it not for the fact that to maintain this result it would be necessary to do a bronchoscopy at least once every two weeks for the remainder of her life.

Let us visualize the changes that have taken place in the right lower lobe. The pneumonogram (Fig. 120) shows the terminal bronchi to be greatly dilated, suggesting finger-like prolongations extending in all directions through the fibrous tissue which has replaced the normal parenchymal cells. The bronchial walls have lost their elasticity, the muscles have been replaced by fibrous tissue, the epithelium has been altered, and has lost its normal cilia. Small bronchi once able to function normally and to rid themselves of secretion have been converted

Fig. 120.—Pneumonogram made by Dr. J. T. Farrel, Jr., after the bronchoscopic instillation of 15 c.c. of lipiodol into the right lower lobe bronchus. Dr. W. S. Manges reported that practically the entire right lower lobe is greatly contracted, there remains very little of the parenchyma, and the bronchi are all very much dilated even to the terminal bronchi; in other words, there is very extensive bronchiectasis.

into elongated, dilated tubes incapable of emptying themselves and now serve as cesspools for purulent secretion, saprophytic bacteria, and their products.

With a view of attacking this problem by external surgery Dr. E. J. Klopp was consulted, who decided that not only was operation feasible but also that the patient's general condition was such that she could be considered a good surgical risk.

The inadvisability of long-continued bronchoscopic treatment in a distally located abscess was clearly demonstrated in the next case to be presented.

Case II.—A man, aged thirty-three years, was referred to the Bronchoscopic Clinic because of cough and expectoration of large quantities of purulent sputum. There was a history of operation under ether anesthesia, also of pneumonia. He had received medical treatment for five months, without relief. On admission there was an irregular fever, evidences of progressive loss in weight and excessive coughing with expectoration of a very fetid purulent sputum varying from 450 to 600 c.c. daily. Dr. E. J. G. Beardsley, who examined the patient, found extensive pathology limited to the right lung and advised bronchoscopic treatment.

Roentgen-ray studies of the chest by Dr. W. F. Manges were reported as showing extensive pathology, evidently an abscess, in the middle and probably the lower lobe. At bronchoscopy there was observed purulent secretion coming from the bronchial orifices of all three lobes of the right lung. A second bronchoscopy was done in one week, with little change noted in the endobronchial appearances of the right lung. At the third bronchoscopy there was no pus observed coming from the right upper lobe, and the purulent secretion coming from the middle lobe did not recur when removed with the aspirating tube. A great part of the purulent secretion could be traced to a posterior branch of the right lower lobe bronchus. Bronchoscopic treatment was instituted at weekly intervals, and in all there were six treatments given. Although it was observed bronchoscopically that secretion no longer came from the right upper lobe, and practically none was seen in the right middle lobe, the total daily quantity was not materially changed and the patient's general condition seemed no better; in fact, there was still a

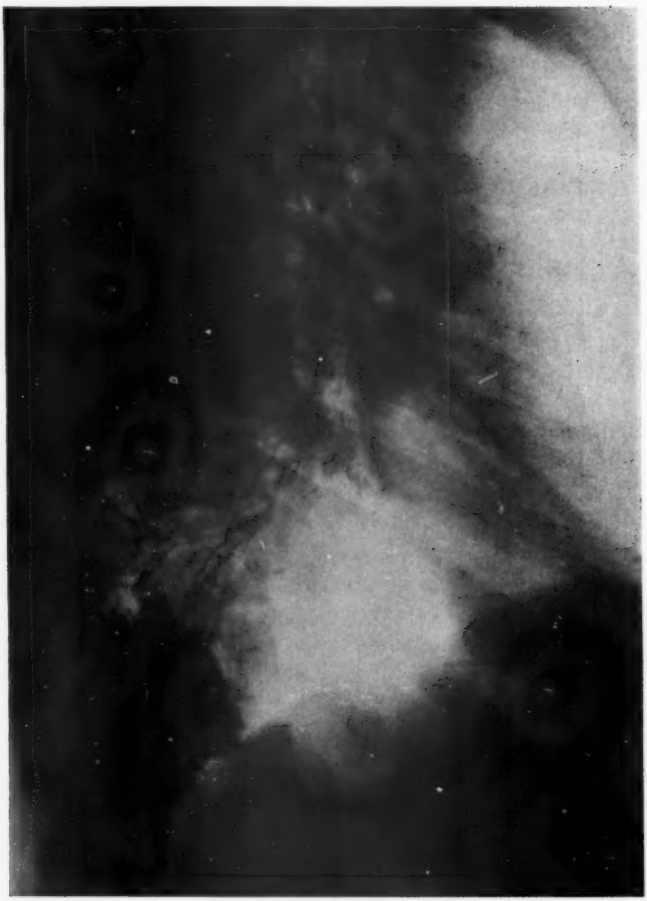

Fig. 121.—Pneumonogram made in the lateral plane in a case of lung suppuration involving the right lower and middle lobes following the bronchoscopic instillation of 20 c.c. of *iodipin* into the right lower lobe bronchus. The iodipin has collected in a mass in the distribution of a posterior branch of the lower lobe bronchus. Its upper margin is on a level with the dome of the diaphragm. The shadow is irregular in outline and suggests an abscess cavity rather than a bronchiectatic dilatation. (Report by Dr. W. F. Manges.)

progressive loss in weight. In order to determine the extent of the lower lobe pathology pneumonography was resorted to (Fig. 121), which showed a rather large cavity in the distribution of the posterior branches of the right lower lobe. In addition, there was also observed a pathologic process occupying a considerable portion of the middle lobe.

Because of the patient's gradual but progressive weight loss and no material change in the amount of sputum expectorated, in spite of the fact that, following several bronchoscopic treatments there appeared to be a clearing of the process in the upper and middle lobes, we called upon the surgeons for consultation. Dr. J. B. Flick, who saw the case with us, agreed that the pus collection in the distal portion of the right lower lobe was not well situated for spontaneous drainage through the normal passages and believed that external surgery should be resorted to. We will therefore discontinue bronchoscopy in this patient and transfer him to the surgical service of Dr. J. H. Gibbon for operation.

These cases demonstrate the value of bronchoscopic assistance not only in diagnosis but also in treatment.

A patient with a lung abscess who would be a suitable case for external surgery is often too great a surgical risk. A course of bronchoscopic treatment will frequently lead to general improvement in the patient's condition and allow surgical intervention with increased safety.

In certain cases of diffuse lung suppuration the peripheral areas of infection will often clear up under bronchoscopic aspiration, leaving a localized pus collection which can then be attacked surgically.

Pneumonography, either by the bronchoscopic insufflation of a radiopaque powder, as bismuth subcarbonate or the bronchoscopic instillation of one of the iodin solutions, is a very valuable aid in the roentgenologic localization of a pus collection and in determining its extent.

CLINIC OF DR. E. L. ELIASON

UNIVERSITY OF PENNSYLVANIA

FRACTURE SYMPOSIUM

Early Treatment of Fractures: DR. E. L. ELIASON.
Non-union and Delayed Union: DR. L. K. FERGUSON.
Fracture Dislocation: DR. DRURY HINTON.
The Fate of Internal Fixation in Long Bone Fractures: DR. E. L. ELIASON.
Demonstration of Fluoroscopic Table: DR. E. P. PENDERGRASS.
Long Bone Fractures: DRS. E. L. ELIASON AND L. K. FERGUSON.

EARLY TREATMENT OF FRACTURES

DR. E. L. ELIASON

TODAY we want to take up the question of the treatment of fractures with particular attention to the manner in which we handle these cases here; it may not be the right way, but it is the way we are accustomed to doing. Recently there has been a great deal of agitation in regard to this subject; in the East and on the Continent there have been certain Fracture Committees formed, with various subcommittees reporting to the Central Committee. These committees meet and discuss the various methods being used in the treatment of fractures and decide on the value of these methods. The British Fracture Committee have taken up the subject very thoroughly, and have formulated rules and regulations by which the treatment of fractures should be governed. Several very interesting points have been brought out at these various meetings, and a few of them I shall touch on this morning. The greatest point, I believe, is the statement that a fracture is an emergency, just as an acute appendix is an emergency, except that it is not so dangerous; and that it should be treated as an emergency because it

is only in this way and by immediate treatment that the best results can be secured. If you see the fracture a few minutes after the accident, it is easily reduced. As time goes on it gets more and more difficult to reduce. With this thought in mind, we have analyzed the last 128 cases of shaft fracture in this hospital; they are cases which we were not able to handle in the Out-patient Department and were admitted to the house. They are selected because of their difficulty.

In these cases open reduction was done in 19 cases (15 per cent.); but if you will bear in mind the explanation given you, this is not a high percentage.

In 9 cases they were reduced in from one to twelve hours.

In 3 cases reduction was after forty-eight hours.

In 3 cases reduction was after seventy-two hours.

In 1 case reduction was after ten days.

In 1 case, after twelve days.

In one case, after twenty-one days.

In all cases one or more attempts had been made at reduction.

Fluoroscopic reduction was effected in 64 per cent. of the cases of fracture of the humerus, in 64.5 per cent. of fractures in the forearm, in 35.9 per cent. of fractures of the tibia, and in 9 per cent. of fractures of the femur. We use a light anesthetic, and have used local anesthesia and novocain bloc in a great many cases done in the last few months which were treated early. I think this had a great deal to do with the success we have secured.

The important points to bear in mind in the treatment are: first, to deshock; second, to consider fracture as an emergency condition.

Deshocking is accomplished by morphin sulphate q. s., heat externally, and fluids internally.

Several times accidents have occurred in the University Gymnasium when I happened to be there, and I have been able to effect reduction at once with results that have been excellent, because there had been no chance for the blood-clot to form or for swelling to occur. Swelling, however, is not a contraindica-

tion to early reduction. If we perform the reduction, we will see that the swelling subsides more rapidly after the fracture is reduced. I have sometimes felt the skin loosen up under the finger while reducing the fracture, and the swelling disappear virtually while one is still watching it.

Time for Reduction.—Late reduction is difficult because, as we know from our pathologic findings, when the fracture occurs there is hemorrhage, and in a few hours clots form and fibrinous deposits occur, and in forty-eight to seventy-two hours a gummy mass is formed. When you try to reduce the fracture at this time you push it up against this mass. You would think it would be easy to do it under the fluoroscope, but it will often swing right out after you have reduced it; and this is due to the clot or to muscle action. As the exudate spreads into the muscle bands it glues them together. This makes reduction more difficult, and our experience has been that if you have a fracture of the femur unreduced seven or eight days, you never get it back in the proper position without an open reduction. This brings us up to the point of the practice of making one to five attempts at reduction. When the patient first comes into your hands try at once to do the best you can for an ultimate result. Use the fluoroscopic reduction, and in this connection Dr. Pendergrass will demonstrate to you later the fluoroscopic room and the reduction table which we use in these cases. Fluoroscopic reduction is of value because it tells us where the fragments are, and the nature of the fracture itself, and you can at the same time see what you are doing and the various muscle actions as you put the fracture in a position of muscle equilibrium. For instance, in a subtrochanteric fracture of the femur, the upper fragment is flexed, the lower fragment is displaced posteriorly by gravity and gastrocnemius pull. There is shortening by virtue of thigh muscle pull. If, using the fluoroscope, you bring the lower fragment of the femur up in line of the upper fragment, flex the leg and relax the muscles; then the fragments will go into place if traction is made in the direction of the upper fragment position. Also, after you have the fracture reduced, you will be able to see under the fluoroscope how

the fragments tend either to slip or to maintain their reduction as you gently manipulate the fragments for this purpose.

Anesthesia.—As I said before, we use either a light gas oxygen anesthesia or nerve block. A circular infiltration with 0.5 per cent. novocain, without adrenalin, reaching down to the periosteum, after the technic of Dr. Farr, for amputation. This gives complete anesthesia. If muscle paralysis is indicated, the nerve itself must be infiltrated with the solution. In one instance of fracture of the humerus, below the deltoid insertion, in which spasm of the muscle prevented maintenance of reduction, a fortunate circumflex nerve infiltration produced relaxation with the resultant reduction. Open reductions are accomplished in like manner.

If positive of the nature of the fracture we will reduce it before putting the patient under the fluoroscope. But usually we like to see the fracture under the fluoroscope before attempting reduction. Our method is to attempt reduction and then look at the result under the fluoroscope; if it is not in a satisfactory position, we make another attempt, being guided by what we have seen.

One of our cases was a boy who broke his arm playing football—fracture about the middle of the shaft of the radius within the insertion of the pronator. He was reduced under local anesthesia, and after reduction plaster splints were applied with the forearm placed in the midposition. An *x*-ray was taken, and it was found that the fragments had slipped out. Reduction under local anesthesia was done twice in three days, with always the same result. With the wound open, under local anesthesia, I could see what the fragments were doing, and by putting the arm up in the three-quarters position the fragments stayed where they belonged. The patient, being under local anesthesia, could help determine the position of equilibrium by flexing, pronating, or supinating the forearm on request.

In one case, in which there was a bronchitis present, the possibility of pneumonia kept us from giving ether, and we did it under a local anesthesia, giving the patient hyoscine, which I believe was a mistake, as it made him intractable. The frac-

ture was reduced three times before the fragments remained in place. He now has ¼ inch of shortening, but his general function is good.

Individuality of Reduction.—It is not necessary in all bones to have perfect anatomic reduction of all fragments; non-union in an uncomplicated fracture of the shaft of the femur is an extremely rare condition, even with marked overriding of the fragments. Why, then, is it necessary to have complete approximation in a man say sixty years of age, when an overlap will unite easily and he will have only a little shortening? If you get fair reduction of the humerus after one attempt, isn't it better than submitting the patient to two, three, and four attempts at reduction with the added danger of union interference. The aim is to accomplish that reduction which our experience has taught us is sufficient for that particular location, age, bone, and character of fracture lines. Overlapping in fractures of the long bones in children does not necessarily need correction, unless, as in fractures of both radius and ulna, it exists in only one bone, the other fracture being in end-to-end approximation. This must be corrected; otherwise bowing will result. In the tibia, femur, and humerus youth compensated for the shortening in a few years.

Individual Care.—The question of individuality in treatment is an important one. You are all familiar with this, and know how much better you can do things at operation if you have the knife in your own hand than you can by watching your assistant. This applies to the treatment of fractures as well, and we find that we get better results if one man handles the case throughout.

Fluoroscopic Reduction.—This is used in as many of the cases as it is humanly possible regardless of the period of the day.

Concerning roentgenology in the treatment of these fractures we are asked how do we manage to prevent too much exposure? This is accomplished, first, by using the precautions I have outlined, viz., wearing two pairs of gloves, putting the fingers under the screen for only the necessary few seconds required to digital manipulation; second, by having the assistant

or the house surgeon alternate with you in putting his fingers under the fluoroscope; and lastly you will find that your roentgenologist will not allow too much exposure.

If one is going to handle fractures, it is well to have a more or less permanent corps of assistants, because otherwise your plan of treatment will be constantly upset.

NON-UNION AND DELAYED UNION

DR. L. K. FERGUSON

Patients with fractures in which union of the fragments has not occurred are among the most pitiable and perplexing with which the surgeon has to deal. In many of these cases the ordinary methods of reduction, fixation, and inspection have been carefully followed, but still with this unfortunate result. The question then arises as to their further treatment.

A study of the causes of these conditions may be divided into two classes—local and systemic.

1. The **local causes** are by far the most important.

(*a*) *Poor blood-supply to fragments* is probably the only factor in non-union in most cases. Both clinical and experimental observations support this view. The most frequent sites of non-union are the middle of the shaft of the humerus and at the lower end of the tibia.

The first is at about the point of entrance of the nutrient artery, and the trauma of the fracture causes, in all probability, thrombosis or laceration of the vessel with consequent reduction of the blood-supply to one or both fragments.

In fractures of the lower end of the tibia the lower fragment must receive the blood-supply from small branches of the anterior tibial artery. This vessel lies in close approximation to the shaft of the bone and is easily and frequently injured by the fracturing trauma, or by subsequent manipulations in reductions. The edema associated with the fracture cocurring between the fascia surrounding the leg and the firm interosseous membrane frequently is enough to cause compression of the anterior tibials.

Clinically, this compression or thrombosis of the anterior tibials may be observed by palpation of the pulse in the dorsalis pedis artery, and by actual sphygmomanometer readings of the blood-pressure distal to the injury. The pulse is found weaker on the affected side, and the blood-pressure is 10 to 15 mm. lower

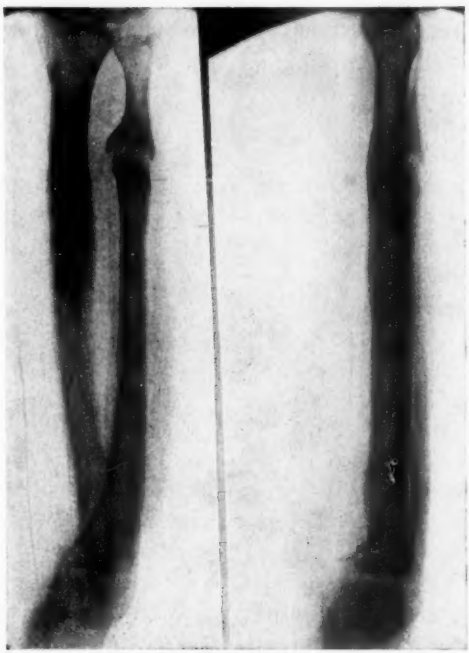

Fig. 122.—Fracture of both bones of forearm in youth of twenty. *x*-Ray taken nine months after open reduction and insertion of Lane plate on radius. Note firm union of radius in contrast to the weak union of ulna. This case surely proves that the factors in delayed union in this case, at least, are local.

(Eliason). It is probable that almost every case of delayed or non-union could be explained on the basis of poor blood-supply if the cases were available for study (Fig. 122).

Since the deposition of calcium salts from the blood is the most important process in bone union, this factor assumes the foremost place in the study of non-union.

(*b*) *Faulty approximation* is frequently given as a cause of non-union or delayed union. This is an avoidable cause and should not be allowed to occur. The interposition of muscle, periosteum, ligaments, nerves, etc., between the fragments usually may be detected at the time the fracture is reduced. If good crepitus cannot be obtained at the time of attempted reduction, or if reduction under the fluoroscope does not give a

Fig. 123.—Old fractures of humerus—midshaft with pseudarthrosis. The excessive callous formation of the upper fragment and the rarefaction at the end of the lower fragment suggest poor blood-supply of the distal fragment as the cause of non-union in this case. Blood calcium and phosphorus in this case are normal.

good result as shown by an *x*-ray plate, the cause can frequently be laid to interposed soft parts. So firm are we in this belief that if good reduction cannot be obtained after one or, at most, two attempts at fluoroscopic reduction, we have resorted to open reduction, where we have almost invariably discovered muscle interposed between the fragments. This is especially the case in fractures of both bones of the forearm.

(*c*) *Faulty fixation* is probably the least important of causes given for non-union. Fixation of many long bones—*e. g.*, the ribs and clavicle—has only to be relative to be useful to effect union. Fixation has a definite place, however, in the avoidance of non-union. It prevents, of course, displacements of the fragments, and it prevents injury to the many small blood-vessels which grow from the bone and periosteum into the callous to contribute their share of calcium-laden plasma to form bone (Fig. 123).

(*d*) *Infection* and *compound fractures* are said to be prone to give non-union. This has not proved to be the case in our experience. If the same precautions as to fixation and approximation are taken in open fractures as are followed in closed fractures, non-union rarely occurs. It is frequently found difficult to apply fixation dressings to compound fractures on account of the dressings necessary for the care of the wound. In such cases we have not hesitated to perform an open reduction with the application of a Lane plate. The fixation and approximation thus obtained is usually enough to give good union in conjunction with suitable external splints. The plate frequently has to be removed later, but not till after union has occurred.

2. **Systemic factors** probably play a larger part in fractures whose union is delayed than in those in which union does not occur at all. They are probably more easily treated and remedied than are the local factors.

(*a*) *Debility* and *asthenia* may frequently be associated with delayed or non-union. The anemia and asthenia associated with tuberculosis, malignant disease, etc., may make a situation in the body in which the general reparative powers are low and consequently slow (Fig. 124).

(*b*) *Deficient blood composition* has of late risen to prominence in the consideration of delayed union in fractures. Normal union is accomplished by the deposition in the fibrocartilaginous callus of calcium phosphates and carbonates. The materials of which this deposit is formed are carried in solution in the blood-serum, and it is for this reason that the blood-supply at the fracture site must be good.

In studies of rickets, where bone formation is slow, it has been found that the blood phosphorus content is low. In other cases associated with tetany the blood calcium content is likewise reduced.

From these studies in rickets other workers, notably Tisdall and Harris, of Toronto, have followed the clinical change in the

Fig. 124.—Case of osteomalacia in boy thirteen years old. He sustained two fractures at the site of arrows which united slowly, but firm union has eventually occurred. Blood calcium was reduced in this case.

blood during bone union. The blood phosphorus was found to rise to the high level found in children when ossification is taking place, and it fell greatly after union had occurred.

In contradistinction to this Peterson made a clinical and experimental study of the blood in non-union, finding no calcification of the callus in dogs on a low phosphorus diet, while

the feeding of phosphorus-containing foods brought about the union.

These and similar workers formed the proposition that no calcium salts would be deposited if the product of the blood calcium (normally 10 to 11 mgm. per 100 c.c.) and blood phosphorus (normally 3 to 4 mgm. per 100 c.c.) was less than 30. This study promises to lead farther in our knowledge of bone formation.

(*c*) *Endocrine factors* as important in bone union were emphasized by Kolodny. His experimental studies in union after the extirpation of the thyroid, pancreas, and the testes in young animals seemed to show delayed union, and he advances the theory that hypofunction of the endocrine glands may be the cause at least in part of delayed or non-union.

Treatment.—With this outline of the causes of delayed or non-union in view, what measures may be expected to be of value in their prevention and treatment?

1. The *prophylactic treatment* is more important than treatment after the conditions exist. Apposition of the fragments sufficient for function may be obtained in nearly every case of fracture. Fixation should be comfortable and firm. The blood-supply to the fragments cannot easily be increased, but every effort in the early treatment should be bent toward preserving that already there. We have noticed that the swelling in most cases is proportional to the displacement of the fragments, and that the local edema disappears soon after reduction. For this reason early reduction is recommended that the compression of the vessels may be relieved as soon as possible. In cases of fractures of the lower tibial shaft with a tense shiny skin, when tissue destruction threatens, we have relieved the edema by a small incision extending through the firm fascia surrounding the lower leg. Elevation is practised only for a short time. After one or two days the part is lowered to the level of the body or below. By this method we have found that the blood-pressure distal to the fracture may be raised 5 to 10 mm. of Hg. Careful attention to these details frequently will prevent delayed and non-union.

If there is no union in the usual length of time taken for that fracture, treatment is begun for *delayed union*.

This may be divided into *local* and *constitutional*.

The *local treatment* consists in efforts to induce an active hyperemia about the fracture site. This condition may be induced in three ways:

1. Local heat: The patient is sent to our Physiotherapy Department, where the part is baked for thirty minutes daily at 250° to 300° F.

2. Massage: Gentle massage by an intelligent masseur is intended to increase the local circulation.

3. Function with fixation: We try to put the limb back to normal function as quickly as possible. This may be done if splints or braces are so fitted as to hold the fragments in position.

If the fracture is of the lower extremity, braces are applied with leather cuffs above and below the fracture, and patients are allowed weight bearing, at first with the support of crutches and later with a cane.

Upper extremity fractures are likewise treated with braces and function is permitted. Frequently 90 per cent. function is possible without much inconvenience to the patient.

The active motion in the surrounding muscles and the slight frequent trauma obtained by function of the limb frequently causes enough of a local reaction at the fracture site to bring about union.

Constitutional Treatment.—Besides these local measures attention must be turned to the systemic causes for delayed and non-union. The anemia and asthenia is treated by the administration of iron, best as arsenato-di-ferro, and an effort is made to supply an abundance of good food, fresh air, and sunshine. A diet high in phosphorus is usually prescribed, and frequently calcium lactate is given by mouth.

Lues, which we have found rarely, is treated if the Wassermann is positive. Thyroid extract is given (gr. ii t. i. d.) with the idea of increasing the general metabolism and to supply the lack suggested as a factor by Kolodny.

Non-union is a diagnosis which is too often made too early. No time limit can be placed as the point when this diagnosis is permissible. We have had cases in our experience who have shown union more than a year and a half after the fracture occurred under the treatment outlined above. Because of this fact we have been loathe to operate on these cases, so that now operation is resorted to only in those cases where union has not taken place and where function cannot be restored by the use of braces.

The operative treatment varies according to the individual fracture, and has varied from simple resection of the rarefied bone ends to the more complicated operations of gutter grafts, medullary pegs, and the use of the osteoperitoneal grafts.

FRACTURE DISLOCATION

DR. DRURY HINTON

About one year ago 2 cases of compound fracture dislocation of bones of the upper extremity were seen by us, and these created an interest in the subject of fracture dislocation as a whole. Some studies were made on the subject and some statistics compiled. These are illustrated by slides as follows:

TABLE 1

FRACTURE DISLOCATION	Cases.
Ankle	28
Shoulder	63
Elbow	65
Wrist	34
Clavicle	8
Miscellaneous	4
	202

Nearly all of these cases were the result of severe violence; for instance, a fall with all the force exerted on one extremity. In reviewing the cases we found that 202 cases had been treated at this hospital in the past twenty years. We are at present in the midst of our study, and are not yet prepared to give the final results. The age incidence was almost equally well dis-

tributed among the second, third, and fourth decades. After the third decade we had approximately 50 cases.

TABLE 2

DISLOCATION

Of the clavicle		8 cases
With fixation of the outer end of clavicle	3	
scapula	3	
humerus	2	

TABLE 3

Dislocation of the ankle		28 cases
With fracture of the bones of the leg	17	
tarsus	5	
foot	6	
Posterior lipping fractures		7 cases
Posterior dislocation		11 "
Lateral dislocation		3 "

TABLE 4

Dislocation of the shoulder		63 cases
With fracture of the greater tuberosity alone	37	
upper end of the humerus	17	
shaft of the humerus	4	
scapula	5	
Subcoracoid dislocation		54 cases
Subglenoid dislocation		8 "
Posterior dislocation		1 case

We feel that the large number of simple fractures of the greater tuberosity noted in *x*-ray reports are really fracture dislocation of the shoulder with the dislocation reduced.

TABLE 5

Dislocation at the elbow		65 cases
Radius, anterior, with fracture of both bones		3 "
Radius, anterior, with fracture of one bone		15 "
Radius, anterior, with fracture of humerus		2 "
Radius, posterior, with fracture of humerus		2 "
		22 "
Radius, anterior, with fracture of the shaft of the ulna		10 "

These are the most troublesome fractures we have to deal with, and require a great deal of thought. We find when we

reduce the head of the radius, the shaft of the ulna slips out, and vice versa, unless these cases are dressed in complete extension. The fluoroscope is of great help in these cases.

TABLE 6

	Cases.
Dislocation of both bones, posterior, at the elbow with fracture of both bones	4
ulna	6
radius	19
humerus	9
miscellaneous	5
	43
Elbow, posterior, combined with fracture of head of the radius	15
Elbow, reduced, combined with fracture of coronoid	5

TABLE 7

Dislocation of the wrist	34 cases
With fracture of the forearm—both bones	12
forearm—one bone	6
carpus	10
metacarpals	2
miscellaneous	4

TABLE 8

1. Do fractures of the greater tuberosity mean reduced dislocation?
2. Do fractures of the coronoid mean reduced dislocation?
3. Are fractures of the surgical neck the result of the Kocher method?

1. We think they do, but we are not yet prepared to make a definite statement. We do know that the diagnosis of bursitis was less common years ago than it is now. A large number of so-called fractures of the greater tuberosity in the past were quite possibly bursitis. On going over our follow-up reports on fractures of the greater tuberosity and on fracture dislocation of the shoulder, we found that full or nearly full function of the joint was not resumed for one, two, or three years after the injury. This should help us in our prognosis, and should teach us not to expect too much at too early a date.

2. Some of these cases have considerable disability; is it not possible that if we considered them reduced dislocations we might treat them in a different manner?

3. Occasionally we get a case admitted with the diagnosis of fracture dislocation of the upper end of the humerus. The *x*-ray will show a fracture of the surgical neck associated with dislocation. Frequently we get a history of manipulation in an effort to reduce the dislocation. This effort at reduction is nearly always by the Kocher method. Is it not possible that the fracture occurred at that time?

At the present time we believe in early joint motion for fracture dislocations, and since callus from a fracture never grows into the joint, you can do no harm by early motion. We insist on active motion; if passive motion is used, it must be very guarded. Both should stop short of pain. Accurate anatomic reposition is essential, especially in those joints which have a wide range of motion. The more active the joint, the greater accuracy we insist upon, and we advocate open operation, if necessary, for this reduction. I rather feel that we are too conservative. I believe that if we operate early and secure accurate reposition of these fragments our results will be better than they are at the present time.

THE FATE OF INTERNAL FIXATION IN LONG BONE FRACTURES

DR. E. L. ELIASON

One of the most important fracture questions under discussion today by surgeons doing this work is the use of internal fixation. When should it be used; what should be used; and what should be the after-treatment?

Indications for Open Reduction.—(1) Operation should be recommended when there is an ability to obtain a satisfactory reduction. By such a reduction is meant not necessarily a perfect anatomic reposition, but that degree which experience has taught will give an ultimate functional result. In other words, under certain circumstances (humerus, radius and ulna, and in children the femur, tibia, and fibula) some overlapping of fragments is often best left alone provided it does not limit motion (Fig. 125).

(2) When reduction cannot be maintained sufficiently well to give the function that experience teaches us should be obtained. Figure 126 illustrates this very well. Deformity here

a *b*

Fig. 125.—Fracture of both femora in a boy eleven years old: *a*, Left femur (the right is identical with this) showing 1½ to 2 inches overlap together with separation of fragments. Despite this, solid union occurred as shown by *x*-ray (*b*) taken five years later. This boy was too ill from a brain condition to permit operative reduction. His limbs are now, five years later, not noticeably short.

would have interfered with the function necessary for this college athlete.

(3) Many compound fractures require internal fixation. It is our practice to operate all compound fractures that are evi-

dently contaminated. A clean puncture wound made by the bone fragment protruding through the skin in a cleanly person with clean clothing is treated as a closed fracture. The same type of fracture occurring in a ditch digger of uncleanly habits and earth-soiled clothing and skin would be operated upon; a dèbridement is done at every compound fracture operation, and internal

Fig. 126.—Note the radius repair as contrasted with the ulna. The boy is working with a gymnastic team six months after injury.

fixation applied in every instance except when the nature of the fracture line permits of a very stable maintenance of reduction.

When there is a spiral, oblique, or a comminuted fracture, with resulting instability, internal fixation is applied. If the case is gotten early—*i. e.*, within six hours—the wound is closed loosely with drainage installed. If infection is expected, the

wound is left open and dakinized for secondary closure. Should infection not occur, our work is done. Should infection occur, the internal fixation holds the fragments in position for days or weeks until the fibrosis results in a natural fixation tending to

a *b*

Fig. 127.—*a*, This bone was plated in the presence of an extensive loss of tissue and a torn posterior tibial artery. *b*, After débridement there was not enough tissue to cover the bone or the plate for a distance of 3 inches. Despite infection the plate held for three weeks. Note the result. This man has no shortening, perfect joint function, and but slight limp after one year.

prevent much displacement, at which time the internal fixation (metal) can be lifted out (Fig. 127).

An argument against internal fixation in these cases is that it opens the bones for medullary contamination.

In our experience deep infection always involves the bone cavity, and such being the case, the screw holes will be the

means of beneficial drainage. If, however, internal fixation is not used and pus appears, the fragments are almost sure to become displaced during the frequent dressings, and a vicious result occurs, which will permit of no surgery for six months after the wound is closed.

(4) When assurance can be given the patient that he will obtain a better result by reason of our interference, with operation and internal fixation. This will depend on the experience of the operator, the operating room technic, including apparatus and assistant corps, the after-care, and the patient's condition. In this last connection, needless to say, age, invalidism, certain psychoses, drug addiction, non-union, etc., are contraindications.

The pendulum is gradually swinging away from the (in the recent past) common custom of open reduction, and we find that less and less open reductions are being done as our experience in these cases increases and the treatment carried out as outlined in the first article in this Symposium.

In an analysis of the fractures at the Howard Hospital and the University of Pennsylvania Hospital the following table is very instructive. Open reduction was performed in 254 cases of a total of 5510 by several different operators. Internal fixation was used in 193 cases, with known results, 47 cases not followed; and the materials most used were the Sherman plate with screws.

TABLE 1

INTERNAL FIXATION

Bone.	Number.	Plate plus.[1]	Wire plus.[1]	Grafts.
Femur	79	70	8	1
Both bones of leg	50	49	1	
Humerus	37	26	10	2
Both bones of forearm	14	11	1	2
Radius	6	5	1	
Ulna	7	2	4	
	193	163	25	5

47 additional cases were not followed up.
14 more cases were reduced openly, but no internal fixation was necessary.

[1] Means screws, brads, nails, etc.

Choice of Internal Fixation Appliance.—As shown by the table on page 308, it is the plate and screws supplemented occasionally by a wire in selected cases. Wire alone will break; screws alone are not stable enough. Parham-Martin bands sometimes result in absorption and subsequent fracture. Today the plate is almost the universal preference.

Precautions in the application of the plate must be taken. The limb must be placed in the position of muscle equilibrium, supplemented in femur cases by skeletal traction as well as external fixation. Internal appliances should not be depended upon for fixation beyond a few days, because pressure necrosis occurs and the screws pull out if the muscles are not balanced. The plate must lay flat on the periosteum and should be well buried in the soft tissue. A dry wound must be obtained as well as rigid asepsis.

After-treatment.—If the after-treatment of a plated fracture is properly carried out by proper external fixation and weight traction so that no strain comes upon the screws, the plate will remain in place. Proper application, as above described, plus proper postoperative treatment, will result in a proper result, which means that the plate can be left *in situ* and need never come out.

TABLE 2

CAUSES FOR REMOVAL OF PLATES

	Cases.	Removed.	Infected.	Imperfect treatment.	Pain.
Femur	73	22	11	11	1
Both bones of leg	50	10	8	..	1
Humerus	26	6	3	4	
Both bones of forearm	27	5	3	..	1
	176	43	25	15	3

In 31 compound cases 12 plates were removed, 7 of which were for infection; 22.5 per cent. as compared to 14 per cent. removed for infection in primarily closed cases.

By proper care is meant asepsis, drainage for forty-eight hours, postoperative fixation and traction, in the position of muscle equilibrium.

TABLE 3

NUMBER OF PLATES REMOVED WHEN UNDER PROPER CARE

	Cases.	Removed.
Femur	16	1
Both bones of leg	9	1
Humerus	5	0
Forearm	3	0
	33	2[1]

The following table shows the number of cases in which the plates are still *in situ*, causing no symptoms, and the number of years since they were placed on the fracture:

TABLE 4

FATE OF PLATES

Cases.	Years.
6	1
4	2
3	3
2	4
2	6
1	7
1	8
5	10
3	11
1	14
28	

The above figures were taken from our follow-up figures in 1925.

A TABLE FOR REDUCING FRACTURES WITH FLUOROSCOPIC GUIDANCE

DR. E. P. PENDERGRASS

In adapting a table for the reduction of fractures with the aid of the fluoroscope there are several features that the table must have:

First, the table must be adaptable to any fracture.

Second, the table must be easy to adjust.

Third, one must have two oil-immersed *x*-ray units arranged in such a manner as to enable one to obtain *x*-rays from two

[1] One of these was originally compound.

directions, preferably at right angles to each other. This gives the surgeon an opportunity to reduce the fracture without the necessity of rotating the injured member.

Fourth, such a table must have apparatus to give extension, flexion, and fixation.

Fifth, it must be easy to keep clean.

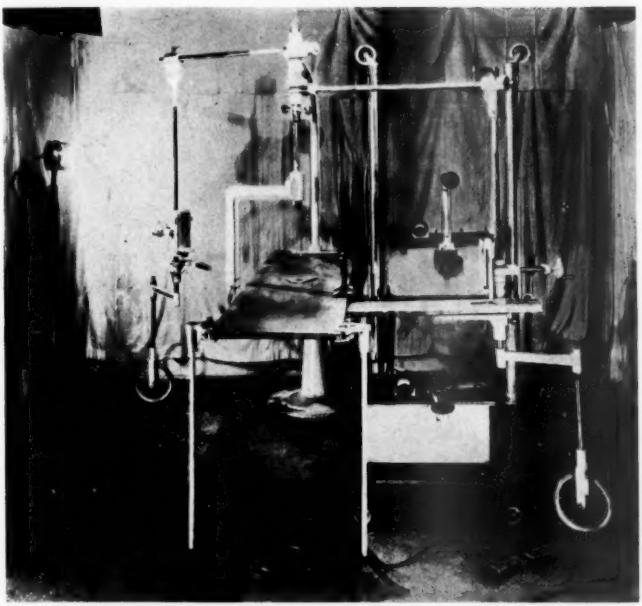

Fig. 128.—The fluoroscopic table adjusted to reduce a fracture of the forearm. The table is covered with a thin sheet of aluminum. The arms are adjustable for extension. The under part is clear in order that the oil-immersed *x*-ray units can be moved *ad libitum*.

Sixth, all *x*-ray equipment must be safe for the patient, surgeon, roentgenologist, and assistants. This, of course, precludes exposed wires, as the reduction is performed in a dark room.

In using the fluoroscope the tendency is to overexpose the patient and the surgeon. It is a rule in our department that one

should always use the intermittent control in examining any patient by the fluoroscope; that is, the fluoroscope is used for one second and then turned off for a second, thereby lessening the tendency of overexposure. In reducing a given fracture the

Fig. 129.—The table is arranged for reduction of a fracture of the left leg. All parts can be fixed or removed. The table has all of the advantages of a Hawley table.

location and type of injury is first determined by the fluoroscope; then the surgeon reduces or attempts to reduce the fracture in the usual way. If unsuccessful, the fluoroscope is used to aid in visual reduction. If the reduction and maintenance of reduction is successful, the appropriate dressings are applied at once.

The use of the fluoroscopic table should not at any time prevent one making the usual *x*-ray films for records and more exact interpretation.

Our recommendation is that every patient should have at least three *x*-ray films:

(*a*) Directly after the accident, or as soon as possible.

(*b*) After fluoroscopic reduction.

(*c*) After final removal of the dressings.

The films then act as a permanent record of the case and also afford a good record should there be any legal proceedings.

The advantages of a fluoroscopic table for the reduction of fractures are many, some of which are as follows:

(*a*) The number of open reductions is lessened.

(*b*) The number of ether or local anesthesias is decreased.

(*c*) The economic advantage is of importance to the patient, surgeon, roentgenologist, and hospital, because the fracture usually only requires one reduction, thereby taking less time of the surgeon, roentgenologist, and assistants. The convalescence is shorter, therefore the hospital has a quicker turn-over of patients.

(*d*) The number of *x*-ray examinations is materially lessened.

Finally, such a table facilitates the handling of all cases of fractures as an emergency (Figs. 128, 129).

FRACTURES OF THE LONG BONES

Drs. Eliason and Ferguson

The rest of our time this morning will be given over to a demonstration of the fractures of the long bones of the extremities and to a discussion of our methods of treatment. We have reviewed the fracture cases which have come under our care during the past three years, and we have here some 80 patients who will serve as illustrations of the results we have obtained.

Fractures of the Humerus.—House cases, 25 (a large proportion of the fractures of the upper extremity are treated in the Receiving Ward or the Surgical Dispensary and are not admitted to our wards).

(1) *Site:* Upper extremity of bone, 6 cases.
Shaft fractures, 7 cases.
Lower extremity of bone, 12 cases.

(2) *Compound* (2 cases): Both supracondylar fractures.

(3) *Reduction:* (*a*) Fluoroscopic—16 cases (64 per cent.)—only one attempt was necessary in most cases.

(*b*) Open—2 cases—indicated because of

1. Interposition of soft parts, 1 case.
2. Old fracture, 1 case.

(4) *Dressings* were applied to hold the fragments in the position in which they stayed reduced, thus they varied according to the individual fracture.

(*a*) Fractures of the upper half of the humerus, 13 cases.

Seven of these cases were held in position best by the application of the abduction plaster cast plus an internal right-angled splint.

Figures 130, 131: The cast extends from the wrist to a point well up on the shoulder, and holds the forearm midway between the pronator and supinator. These fractures of the upper extremity of the humerus were best maintained in position by the use of a shoulder-cap and small axillary pad, bandaging the arm to the body. The forearm should be slung at the wrist and this sling included in the body bandage.

One case of greenstick shaft fracture in a child was treated with axillary pad alone and the arm bandaged to the body as above. One old ununited fracture was given a brace. One case of multiple fractures was simply immobilized.

(*b*) Fractures above the elbow, 12 cases.

In 5 cases the arm was dressed in plaster, with the forearm in complete supination and acutely flexed on the arm (Eliason). The plane of the arm should be at right angles to the lateral plane of the body, and the elbow should be held well back. The plaster bandage should include the hands as far as the fingers (Fig. 132). The Jones position was used in 4 cases. Open reduction was done in 2 cases and plaster dressings applied. In 1 case of compound fracture traction was used without splint dressings.

Fig. 130.

Fig. 131.

Figs. 130, 131.—Abduction plaster dressing for fractures of the humerus, shaft, and upper extremity. Note that jacket comes high in axilla.

(5) *After-treatment:* No definite rules can be made for the after-treatment of all cases, but, in general, we follow the following plan:

(*a*) For upper humerus fractures in the Eliason abduction cast dressing:

After two to three weeks the cast is removed from the dorsum and sides of the forearm, allowing for gentle massage of the part. Passive motion (flexion) at the elbow is given, care being taken not to allow the slightest rotation of the arm above the elbow.

Fig. 132.—A lateral hyperflexion dressing.

Moderate active motion of the fingers and the wrist is permitted.

This procedure is repeated every second day, the arm being held by a bandage to the remaining forearm splint during the interval between treatments.

After the fracture is five weeks old the cast is cut away from the external surface of the arm, permitting passive motion (abduction of the arm) of the shoulder-joint, with rebandaging of the arm to the remaining splint during the intervals.

In six to seven weeks the cast may be removed entirely and the arm placed in a splint. Baking and massage may be used to advantage, and the patient should be instructed to move his joints many times daily.

(*b*) For fractures above the elbow in the Eliason lateral hyperflexion dressing:

After ten days to two weeks the cast is removed, and the patient placed in the Jones position for a ten-day period. During this time the elbow is flexed passively and painlessly every second day through an arc of about 30 degrees. The flexion should be equally more or less acute than the Jones position. Baking and massage may be begun at this time. At the third week an internal right-angled splint should be applied, being removed every second day to allow passive flexion of the elbow. This flexion should equal that of the Jones position. If there is any obstruction to that amount of motion, the arm should be replaced in the Jones position for a time. In four weeks the splints may be renewed and the arm placed in a sling, and the patient instructed to gradually use it. In all fractures of the humerus the patient should be warned against too early resumption of normal function. Elbow function returns slowly and should not be hastened by painful passive motion. Weeks and even months are not too long a period to wait. Let nature do it. Children obtain excellent results; adults, only fair ones.

(6) *Hospital days:* Twenty simple fractures spent seventy-six days in the hospital, averaging 3.6 days per patient.

Four cases of compound fractures or open reduction cases averaged about forty-six days in the hospital.

(7) *Complications:* Two cases of temporary musculospiral palsy developed; 1 patient died with an associated hemopneumothorax. One patient showed a bone-cyst at the site of the fracture.

(8) *Results:* One death—traumatic pneumothorax.

Of the remaining 24 cases, 19 have been followed:

Nine cases showed perfect anatomic and functional results.

Eight cases showed good result, with some limitation of motion.

One case of compound supracondylar fracture shows almost complete ankylosis at the elbow due to subperiosteal hematoma.

One case (midshaft) shows no union. (Fracture one year old on admission.)

Fractures of the Bones of the Forearm.—House cases 31—22 out of the 31 involved both bones.

(1) *Most frequent fractures:* Both bones—junction of lower and middle thirds, 11 cases. Suprastyloid of radius; styloid of ulna, 12 cases.

(2) *Compound* (8 cases): Five showed fractures of both bones.

Two showed an associated dislocation of the head of the radius.

One showed an assocated dislocation of the semilunar bone. Each compound fracture of the forearm thus may be expected to be accompanied by another fracture or a dislocation.

(3) *Reduction:* (*a*) Fluoroscopic—21 cases (65 per cent.)—of forearm fractures.

Of these, 13 had had one or more previous attempts at reduction elsewhere.

(*b*) Open—9 cases—2 with internal fixation; 7 without internal fixation.

The indications for operation in these fractures were:

Compound fractures, 3 cases. Fracture too old, 1 case. Interposed soft parts, 5 cases.

In the fluoroscopic reduction of fractures of both bones of the forearm we have found the following rule helpful: If the fractures are midshaft or above, reduce the ulna first; if the fractures are in the distal half of the forearm, reduce the radius first. With one bone reduced, it may be used as a fulcrum to manipulate the other bone in place.

(4) *Dressings:* Molded plaster splints, anterior and posterior, were used in most cases. Except in suprastyloid (Colles) fractures an internal right-angled splint was used in addition. This splint should be long enough to extend to the ends of the fingers (Figs. 133, 134).

(5) *After-treatment:* The patient should be seen or heard from within the first six hours, and then every three or four days

Fig. 133.—Plaster splint dressing for fracture of both bones of forearm. Note that the plaster splint extends to the ends of the fingers. These splints are bandaged on separately. Bandage was omitted in the illustration.

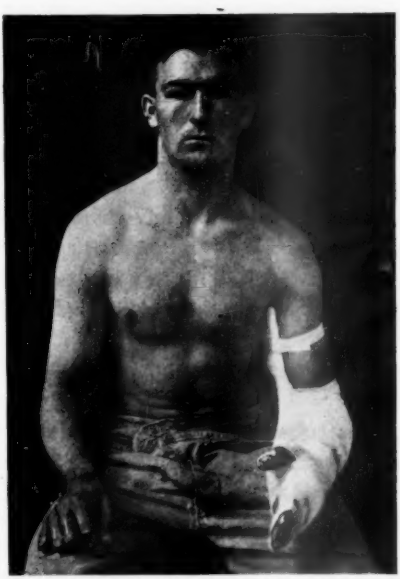

Fig. 134.—Complete dressing for fractures of bones of the forearm, showing internal right-angled splint in addition to plaster splint.

after reduction. At this time the internal right-angled splint should be removed and motion of the elbow joint given. Then the anterior and posterior splints may be removed one at a time, and gentle motion allowed of the wrist- and finger-joints. In suprastyloid fracture rotation of the forearm should also be given, making special effort to get good supination. For this movement both splints may be removed and the site of fracture supported in the surgeon's hands. Fractures of the shaft should not be allowed rotation for two to three weeks after the fracture.

In adults the internal right-angled splint may be removed in ten days, leaving the anterior and posterior plaster splints shortened to release the fingers, with the arm carried in a sling. It is well to leave the right-angled splint in children until the third week.

After five to seven weeks one or the other of the plaster splints may be removed, and the arm supported by the single remaining splint.

If union is solid in six to eight weeks, all the splints may be removed and the arm placed in a sling. The patient should be encouraged to give the arm gentle active motion. Normal function should not be attempted before the tenth week of the fracture.

If union is not solid, the remaining splint may be shortened after the eighth week to allow rotation of the forearm.

(6) *Hospital days:* The 31 cases, including the open reductions and compound fractures, averaged 6.5 days in the hospital.

(7) *Results:* Twenty-five cases have been treated.

Of these:

Fifteen have perfect anatomic and functional results.

Eight have moderately good results, the disability being a limitation of rotation of the forearm in all cases.

One has a poor result, with marked disability due to tendon fixation in the fracture healing.

One case showed non-union of the radial shaft in the lower third (later united).

Fracture of the Femur (Neck and Introchanteric Fractures).—Fourteen cases—42 per cent. of femur fractures; 12 of these cases were over fifty years of age.

(1) *Reduction* by traction was the rule.

Eleven cases—traction in Thomas splint followed (two to twenty days) by Whitman abduction plaster cast.

One case—tongs and Thomas splint.

One case—sand-bags—eight years old and incontinent.

One case—died of cerebral embolus before the treatment could be started.

(2) *Hospital days:* Average forty-seven days.

(3) *Complications:* Those of old age and debility.

Acute gastric dilatation after application of cast, 1 case. Incontinence of urine and feces, 1 case. Epileptic seizures in cast, 1 case. Mental deterioration, 1 case.

(4) *Results:* Three deaths. One from cerebral embolism the day following admission in a patient sixty-eight years of age.

One from senility—eighty-one years—eighteen days after fracture.

One from transverse myelitis eleven weeks after fracture.

Of the remaining 11 cases, 10 have been traced:

Five have perfect anatomic and functional results.

Three have ½-inch shortening, with good function.

Two have 1-inch shortening, with good function, but walk with a slight limp.

Fractures of Femur (Shaft and Supracondylar Fractures).—Nineteen cases, of which 13 were less than twenty years of age.

(1) *Compound:* Two cases.

(2) *Reduction:* (*a*) Under seven years of age—Bryant's position. (*b*) Over seven years.

Traction was made to reduce the fracture, then a plaster cast was applied with the knee and thigh semiflexed. Reduction is usually accomplished by the application of about 20 pounds of traction for forty-eight hours. After the reduction the traction may be lessened to about 12 pounds without harm. Traction, especially in fractures of the lower femur, is best applied by tongs.

(*c*) Fluoroscopic reduction with the application of a plaster cast was practised in 2 cases. This procedure is especially applicable to shaft fractures in young or thin patients.

(*d*) Open reduction was resorted to in 5 cases:

One case appeared for treatment three weeks after fracture and no other form of treatment was attempted.

One case was a compound fracture.

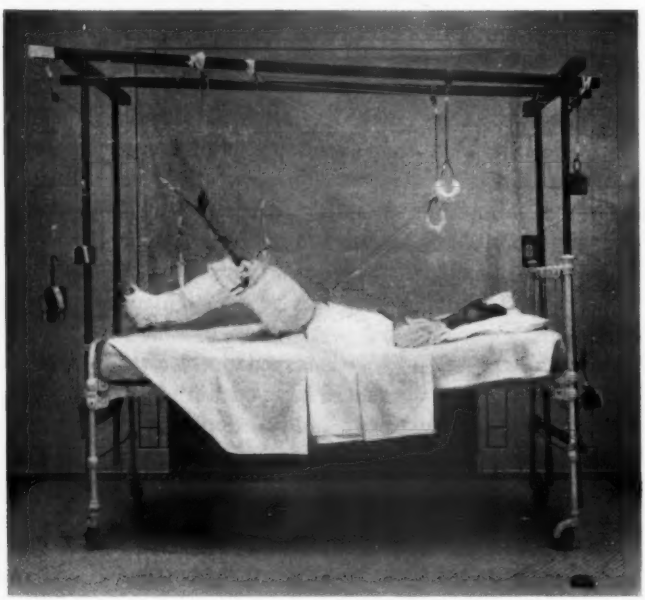

Fig. 135.—Plaster spica flexion dressing for fractured femur.

Three cases could not be reduced by traction, and at operation muscle was found interposed between the fragments.

A Lane plate was applied in each case of open reduction.

(3) *Hospital days:* Average for 19 cases, forty-nine days.

(4) *Results:* One death—in patient sixty-five years of age—a chronic alcoholic, with bilateral fracture.

Of the remaining 18 cases, 16 have been traced:

Thirteen show perfect anatomic and functional results.

One shows osteomalacia.

Two show slight deformity and about 1 inch shortening.

(5) **After-treatment of All Femur Fractures.**—The patient should be kept in bed with absolute (cast) fixation for the first four weeks after the fracture. At the end of this time the anterior part of the cast covering the leg and foot should be cut away, leaving a posterior trough. A wide strip of adhesive may then be bandaged to the sole of the foot, and attached to a rope which leads over pulleys so arranged that the patient may give himself frequent passive motion of the ankle- and knee-joints, replacing the leg each time in the plaster trough.

At the end of six to eight weeks the traction (which had been in use since the first) may be removed, and about one week later the cast may be cut away and the leg allowed to rest on pillows. In older, adult patients the cast should remain on even longer. The patient may be made ambulant in about the ninth to tenth week using crutches and a shoe elevated 1 to 2 inches on the uninjured leg.

There is often marked edema of the injured leg when the upright position is first assumed. It has been our practice to apply tight bandages to the leg for a time.

Weight should not be begun before the fourth to sixth month. It should be begun gradually first on the toe, then gradually with the whole foot, finally discarding one crutch and then the other, substituting a cane to help support the injured side.

Many cases of femur fractures form callus very slowly and too early weight bearing may cause bowing.

Fractures of the Tibia and Fibula (39 Cases).—Fractures of the shaft of the tibia, 24 cases, and of these:

Fifteen were complicated by fractures of the malleoli.

Fractures of the malleoli, 15 cases.

Of the fractures of the bones of the lower leg, over half (21 cases) show fractures of both bones.

(1) *Compound:* Five cases (12.8 per cent.).

(2) *Displacement of fragments* was little, or in 59 per cent. of these fractures, so that a fixation dressing with little or no manipulation is all that is required.

(3) *Reduction:* (*a*) When necessary by manipulation, often with the aid of the fluoroscope.

(*b*) Open reduction was practised in 4 cases; indicated for compound fracture in 2 cases; posterior dislocation of the foot in 2 cases. Internal fixation was applied in all but 1 case.

(4) *Dressing:* Lateral plaster splints in all cases (Fig. 136). These splints are made to extend from the sole of the foot upward above the knee. The knee should be slightly flexed. The splints are made one at a time, molded to the leg, and bandaged on separately.

Fig. 136.—Plaster splint dressing for fracture of the leg below the knee. Note that dressing does not overlap anteriorly, and heel should be allowed to protrude posteriorly.

(5) *After-treatment:* The day after the application of the splints the patient may be allowed up with crutches and an elevated shoe on the normal foot. The leg should be elevated and dependent about equal lengths of time each day. This maintains the normal vascular tone and seems to prevent the edema which frequently forms in a leg which has been elevated and idle over a period of time. The dressings may be changed every three to four days and made more firm as the swelling disappears.

After two to three weeks one splint is cut below the knee and the other above the ankle, and by removing one splint

at a time the motion of the knee- and ankle-joints may be obtained.

In four to six weeks the other splint may be cut off below the knee and full motion of the knee-joint allowed. At the eighth or ninth week all the plaster dressings may be removed. Weight bearing is gradually begun and normal function may be expected in three to four months.

If union is not firm in eight to nine weeks a brace is applied with cuffs above and below the fracture, and weight bearing is encouraged.

(6) *Hospital days:* Average 15.8 days per case; a majority of these patients, however, stay less than ten days.

(7) *Results:* Four deaths.

Two of pneumonia (associated chest injuries).

One of Stokes-Adams syndrome.

One case complicated by a dislocation of the fifth cervical vertebra.

Of the remaining 35 patients, 19 have been traced:

Fourteen have perfect anatomic and functional results.

Four have good results, showing only slight edema of the leg or slight limp.

One compound fracture had a sinus with sequestra formation. The sequestrum was removed and the bone is entirely healed at this writing.

The refinements of methods that we have used in these cases are the use of the fluoroscope for immediate reduction, the use of novocain local anesthesia when practicable, and the employment of molded plaster splints, in preference to the old plaster cast, and the advocating of early active motion in place of passive motion, which is too often pernicious.